FACTORY

MANAGEMENT AND MAINTENANCE

AUGUST 1948

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**As reported by Mr. Joseph Gangloff, electrical contractor and chief electrician for the Edwards Building.*

FACTORY

MANAGEMENT and MAINTENANCE

AUGUST, 1948

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WHAT THE NEW DRAFT LAW MEANS TO INDUSTRY

BUSINESS AS USUAL is not only possible but probable under the new Selective Service Act—at least for the next year. Here's why:

1. Manpower requirements for armed forces—*small.*
2. Steel requirements for armed forces—*also small.*
3. Controls—*no new ones.*
4. Priorities and allocations—*yes, but on defense orders only, and the existing program is modest.*

These conclusions are based on a study of the new law, developments since its passage in June, and an examination of the U.S. national defense program as now authorized.

SWEEPING POWERS TO PRESIDENT

ON THE FACE OF IT, the law looks exceedingly tough. Section 18 gives almost unlimited powers to the government to draft industry, and to set up a peacetime system of priorities for industrial products in general. These provisions were attached to the act in a last-minute amendment by Rep. Walter C. Ploeser (R-Mo.) chairman of the House small-business committee.

It was the Congressman's aim, he has said, to help small business concerns obtain a "fair share" of defense orders. The language of Section 18, however, is held by legal experts to be applicable to American business and industry generally. Not unnaturally a good deal of concern was expressed by executives, particularly in the steel trade, at the repercussions that might follow if the draft law were literally administered with respect to this provision.

Early last month they received assurance from President Truman that the reins would be lightly held. In a letter to Charles Sawyer, Secretary of Commerce, the Chief Executive stated:

"I have given serious consideration to the problems posed by the legislation. I am, of course, prepared to exercise this authority should it prove necessary . . . (but) it should be possible to insure fulfillment of a (defense) program of this limited size through the voluntary cooperation of industry."

It may be assumed that any other President who may be elected next November would adopt a similar attitude.

WILL TAKE 250,000 FIRST YEAR

FEW COMPANIES, if any, will be hamstrung by losing a large number of men through the draft. Informed estimates indicate that only 225,000 to 250,000 men will be required during the first year of peacetime selective service—less than one-half of 1 per cent of the current U.S. working force of 60,000,000.

This number, swelled by enlistments (which the draft always stimulates), will bring the Army up to its authorized strength of 837,000 men. The Navy and Marine Corps are already up to strength, fixed at 666,882. The Air Force, which is expanded from 440,000 to 502,000 men, is expected to attract sufficient volunteers to make use of the Act unnecessary to keep this branch up to strength.

Moreover, in the age group affected by the draft—19 to 25—a comparatively small number of men have reached positions where their leaving would seriously damage operations. In some cases of this type, it may be possible to obtain their deferment under Section 6 (h) of the Act, for reasons of "study, research, or medical, scientific, or other endeavors" being found necessary to the protection of the national health, safety, or interest.

In addition, if a man is a veteran of World War II, or has dependents, or is a member of the National Guard, he has grounds for deferment. Finally, men from every walk of life and type of vocation will be called, which further lightens the loss of manpower industry will bear. So there are sound reasons why companies may expect a minimum amount of trouble with "draft dislocations."

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DRAFTEES WILL GET JOBS BACK

IN COMING MONTHS, management will become increasingly familiar with Section 9 of the Selective Service Act. This deals with reemployment rights. There are two chief rights granted in the Act:

1. An employee drafted from a permanent position with a firm can, upon honorable discharge 21 months later, demand to be reinstated in the same position or one of equal status, seniority, and pay.

2. If, by reason of disability sustained in the armed forces, the draftee is unable to perform his old job, he must be restored to an equivalent one he can perform "or the nearest approximation thereof consistent with the circumstances in his case."

However, neither right may be exercised by the returning employee where "the employer's circumstances have so changed as to make it impossible or unreasonable to do so."

In short, the Act says, employers are to regard draftees from their firms "as having been on furlough or leave of absence during the period of training . . . (they) shall be entitled to insurance or other benefits offered by their employer." A man so reinstated may not be discharged for one year after rejoining the company.

STEEL NOT SERIOUSLY AFFECTED

STEEL receives careful attention in the new draft law. It is the sole commodity singled out for allocation — if necessary. Fortunately, however, steel requirements for the current defense program, like manpower needs, are limited.

Munitions of war—tanks, guns, shells, and the like—are not being ordered in quantity. During the next 12 months, only about $500,000,000 will be spent on such items, as compared to more than six times as much for aircraft. And planes absorb a minimum of steel. (Estimates are 35,000 tons to 45,000 tons of aircraft steel for fiscal 1949.)

Secretary of Defense Forrestal stated recently that "about 2 per cent" of finished steel production would be taken for the armed forces between now and June 30 of next year—between 1,200,000 tons and 1,300,000 tons of metal. He estimated fiscal 1950 needs at "less than 3 per cent."

This loss to civilian markets will be more than redeemed by new facilities now nearing completion. The steel industry expects to bring in 1,000,000 tons of new production late in 1948 and a similar amount in 1949.

So the steel outlook for the next year would appear to add up to this: Defense needs will soak up the lion's share of new steel production now building. They may—depending on foreign developments—even bite into some tonnage now scheduled for civilian markets. Certainly there is little hope of a genuine easing in the domestic steel supply for many months to come. But, on the other hand, the steel situation should not deteriorate under the impact of the existing defense program. As the facts look at this writing, the *status quo* for steel seems likely to be retained without substantial change for some time to come.

NO NEW CONTROLS IN SIGHT

THE NEW DRAFT LAW imposes no new controls on industry beyond those now in existence. As heretofore, the government reserves the right to pay no more than "fair and just compensation" for items purchased, or in rental for a plant, mine, or other facility. And the policy of renegotiating contracts is continued. Aside from these limitations, however, no measures to control or fix prices and wages are in the act.

If the government chooses to use it—and President Truman hopes this won't be necessary—full power to allocate steel and to seize plants, mines, or other facilities, under certain conditions, is granted by the act. Moreover, all defense orders must be given priority.

KEEP FOUR POINTS IN MIND

UNTIL REASSURANCES came from the President, as has been mentioned, these clauses caused grave concern in management circles. If the teeth in this part of the law seem extra sharp, executives would be well advised to keep these points in mind:

1. Official policy is to let voluntary cooperation, rather than government edict, solve the steel allocation problem.

2. The limited size of the existing defense program can be absorbed with almost no curtailment of the civilian economy.

3. Some companies will be handed defense orders and will be called upon to fill them on a priority basis. This policy is no different from the way the vast majority of orders have been handled—voluntarily—until the passage of the draft law. Civilian production, in certain cases, may be curtailed or even halted by defense contracts for some weeks. But the size of the defense program is not large enough to produce large-scale or long-continuing disruptions to civilian manufacturing.

There is one exception to this: The aircraft industry will be chiefly occupied with government orders. Plane manufacturers, however, as pointed out in the May issue of FACTORY ("Airplanes Now for Security," page 88) were dying on their feet for lack of business. Defense orders are saving the industry from disintegrating.

4. With a draft act in the works, management had every prospect of seeing some such clauses as those contained in Section 18 written into the law. It is a political axiom in the United States that one cannot draft men without also drafting industry. Similar measures were contained in pre-World War I and II legislation.

While the government may have the right to draft industry and seize non-compliant plants and facilities —and this was done in both wars—it is also a historical fact that this action was seldom necessary. Thus there is good precedent to predict that few cases of seizure will occur under the new draft act, for all its stiff language on the point.

FACTORY
MANAGEMENT AND MAINTENANCE
L. C. MORROW, EDITOR

THE SERIOUS PROBLEM OF WORKER SECURITY

SOME WAY must be found to give the worker security and at the same time continue the American system of individual initiative. Otherwise this country, like almost every other, will set foot on the road to decadency.

What are the indications that worker security continues to be the principal objective of the labor movement? Three signposts were erected quite recently. One was erected by organized labor alone, one by management alone, and one by labor and government together.

They are, in that order: Establishment of the United Mine Workers pension plan. Formation of an association of companies that practice profit sharing. Action by the International Labor Organization relative to the "guaranteed annual wage."

The pensions for mine workers are to be paid for by a royalty of 20 cents per ton of coal mined. This amounts to about 8 per cent of the payroll of the coal industry. It causes an increase of 22 cents per ton of steel, on the basis of 1.1 tons of coal for every ton of steel produced. These costs passed on to the automobile industry, at 2 tons of steel for every car produced, would be 44 cents per car. They are direct costs only; they include nothing for royalties on steel and royalties on automobiles to pay for pensions for steel and automobile workers. And of course royalties will be the order of the day for the workers of all industries, so the pyramiding effect promises to be enormous.

The association of companies practicing profit sharing recognizes the problem of worker security and is attempting to find the solution of simultaneous security for worker and opportunity for ownership. Its big problem, of course, is to find a formula for sharing loss as well as profit.

Only last month the International Labor Organization adopted a resolution drawing attention to "the desirability of progressively extending, by means of collective agreements, awards, or national laws, as appropriate, the application of the principle of guaranteed wage to wage earners who are subject to temporary layoff." This was no resolution looking toward study; apparently the labor and government groups (who passed the resolution over the objections of the employer group) believe that enough is known about the subject to force agreements as to definition and application.

Theoretically, every worker can enjoy a high standard of living while he works and a worth-while pension after he quits. But, pension funds or no, profits or no profits, wages guaranteed or not, one thing is certain: *Unless the goods and services required for living—and pensions, or profit sharing, or guaranteed wages—are produced by the joint efforts of workers, management, and owners, there will be no possibility of having any one of the three.*

Nobody Can Get Around It— We Must Produce to Have

Until there is widespread recognition of the absolute necessity to produce in order to have, there will be a constant battle by minorities for economic advantage—miners, steel workers, automobile workers, for example—and then by other minorities to pull themselves up level with the first. It is a grand way to share the poverty instead of the wealth, so long as that wealth is not created.

Increased production per man-hour, with resultant lowering of prices, is the answer. Part of the increase should come from the worker as a result of putting his time in to better advantage. Part of it should come from management in the form of better methods and equipment. Part of it should come from ownership by way of more liberal policies concerning investment in capital goods. And part of it should come from government in the form of more economical operation and greater understanding of the problems of industrial management.

Some way must be found.

L. C. Morrow

A MAN CAN KEEP A COW . . .

CULTIVATE HIS OWN ACRES . . .

WHEN INDUSTRY MOVES

A timely study of ruralization — and two practical ways to set up small units in small towns

A LOT of strange things are going on within America's industrial structure. Men's shirts are being shipped out of new little factories in the Mesabi Iron Range country of wild-wooded Northern Minnesota. A few miles away women's lingerie is being produced in a factory that used to be a lodge hall. All over Minnesota, Wisconsin, and Michigan a growing number of textile manufacturers, impressed with these events, are "screening" small towns for potential branch plants.

Local citizenry in turn are organizing committees to put their best foot forward in landing a factory for their town. In the South the same search and countersearch is on, with many small towns actually raising money to build factories which are then offered on nominal or rent-free terms to companies which will equip and operate them. Arkansas alone has a score or more of such grass-roots factories turning out shoes, clothing, and food products.

During the war, Sylvania Electric Products, Inc., which is something of a pioneer in this trek of industry to the small town, ran its string of ruralized factories up to 23. By war's end it was producing diminutive and complex "VT" fuses—one of the war's top secret gadgets—at the rate of *two hundred million per year*. And the cost (mostly labor) had been brought down from $5.50 to 40 cents per unit.

It was a big war, but America's small towns had a hand in winning it. And it looks as if they are continuing to win back some of their formerly basic industrial position in our national economy.

We have long been viewing with enthusiasm or alarm such developments as the migration of industry to the South and West, the industrial rise of the West Coast, or the "apartment housing" of small companies which share space in large industrial installations—many of them surplus war facilities.

A New Industrial Pattern

But in the midst of all this—or perhaps it is more accurate to say around the edge of all this—another kind of industrial pattern is taking shape. It might be called the *ruralization of industry*. Its common denominator amounts to *the bringing of industry in small units to the labor supply and other advantageous production factors available in smaller rural communities*.

As such it has the makings of a reversal of the established practice of drawing more and more people from our hinterland communities to work in

RAISE HIS OWN MEAT . . .

AND BE A TOPNOTCH FACTORY WORKER . . .

TO THE COUNTRY

bigger and bigger factory units. Indeed, there are already observers in both management and organized labor who foresee the beginning of a full-fledged about-face in the growth patterns of our economy.

As factors making for this they cite:

1. The increasingly more favorable living environment in the small town which now has most of the metropolitan advantages without the increasing disadvantages of big-city living.

2. Availability of a new and readily trainable industrial labor supply in the smaller towns, in contrast to labor scarcities in established industrial centers.

3. New managerial and merchandising techniques which enable multiple smaller plants to produce goods and provide service to nation-wide markets in competition with the mass-volume factory unit.

4. The potential military hazard of plant concentration, as well as the individual's fear of residence in or near a potential atomic bomb target.

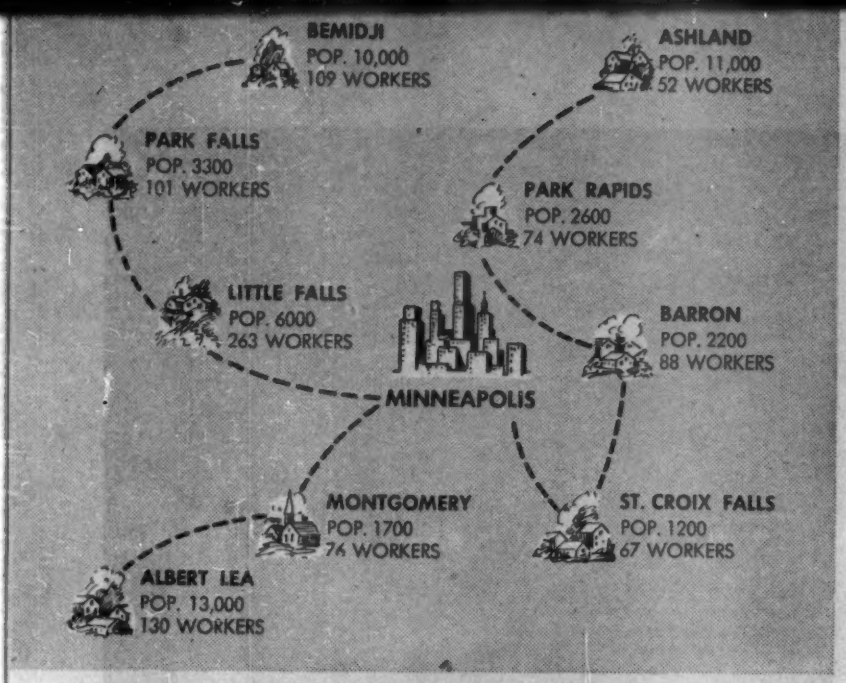
5. A general emotional as well as economic dissatisfaction with the sheer human inconvenience of bigness, either in terms of a traffic-choked city or of being simply a robotized number in the time-card rack of a factory employing thousands of people. The increased emphasis on "the human equation" in management-labor relations is underscoring this factor in favor of the small ruralized plant.

We can be sure that the social theoreticians will be busy rationalizing these and other elements in this ruralization "trend" for a long time; and they are already at it. But few of the individual business executives, whose current decisions are resulting in one new small-town plant after another, are motivated by sociology. They have "hard-headed" reasons for their decisions, even though one executive, who has been through the experience of establishing small-town ruralized plants, observes that "many companies know a lot more about what they are trying to get away *from* than they do about what they are looking *for*."

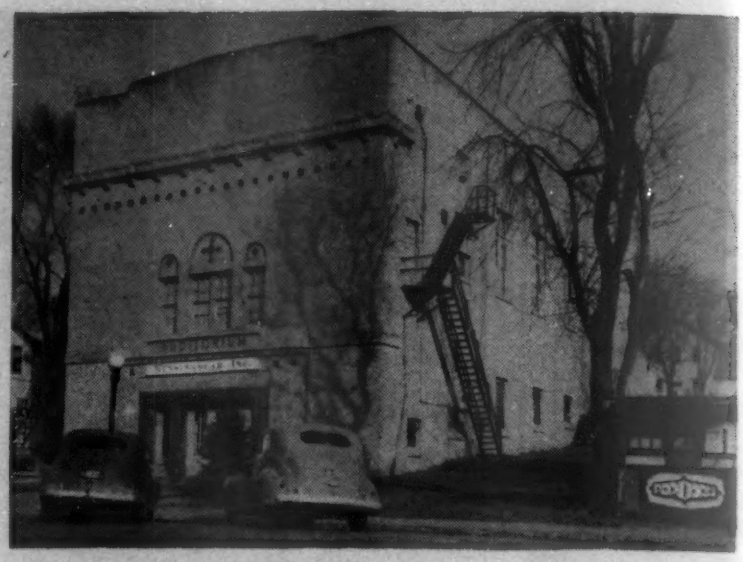
Benefits to companies that "know what they are looking for" when they ruralize—and to communities in which they locate branch plants—are described in the case studies that follow.

Benefits to wage earners are exemplified in the photographs (above) of Roy Hotinger. Roy is a loom fixer at the Glasgow, Va., carpet plant of James Lees & Sons Company (see page 70). He lives on his father's 900-acre crop farm 25 miles from the plant, gets home early enough to help out with the chores, can get time off as needed for plowing.

Some companies find old buildings and convert them. Others start from scratch with brand-new plants. Both methods are described in the pages that follow



WHEN MUNSINGWEAR RURALIZED, IT CONVERTED . . .



AN AUDITORIUM AT ST. CROIX FALLS . . .

A DANCE HALL AT MONTGOMERY . . .

A WOOLEN MILL AT BARRON . . .

Ruralization Method No. 1: Convert an

First pick the right kind of town, says Munsingwear, with the right kind of people in it. Then find an old building that can be converted into an efficient small plant. There always is one.

OVER THE PAST five years Munsingwear, Inc., has put into operation a ruralized program involving small sewing plants in five small towns in Minnesota and four in Wisconsin. Although the program has proceeded on a patient, practical, low-pressure basis, news of its success has got around to the point where in one recent week there were visitors at the Minneapolis offices from Turkey, Belgium, New Zealand, Australia, and Canada. These textile men, like scores of other American industrial observers of the Munsingwear program, wanted to learn the secrets of its solid success.

Made a Survey of Small Towns

But there are no secrets about it, as one quickly learns from Munsingwear's vice-president in charge of production, Clarence Tolg.

"The business economics behind our operations are very simple," observes Tolg, "and we try to keep the human relationships on the same basis.

"Munsingwear's dollar volume has quadrupled since 1939. That's fact one. Fact two is that 90 per cent of our employees are women, and U.S. Department of Labor statistics show that better than 98 per cent of the employable women in the Minneapolis area are now working. These were essentially the conditions that started us to consider branch plants in small towns where labor was available.

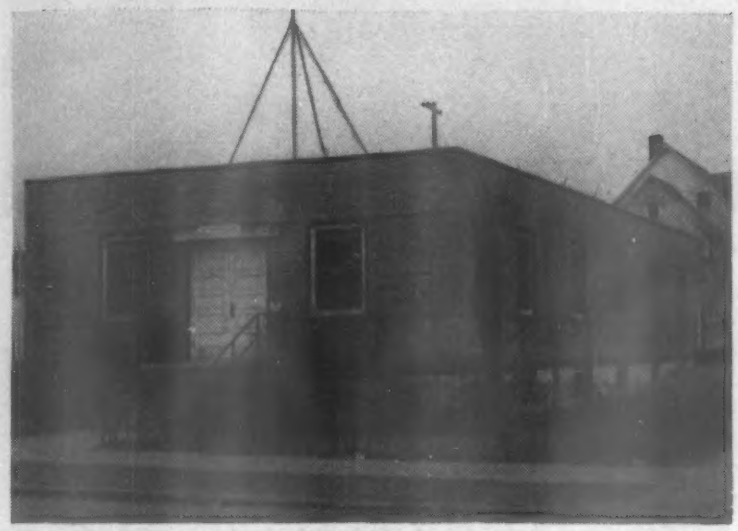
"On the other hand, we were well aware that we wouldn't get far with any solution if we approached it purely from a position of 'what's in it for us.' Accordingly, we made a survey of small towns in Minnesota and northern Wisconsin to find out:

"1. What unused assets they had in the way of employable women and idle space suitable for our purposes and which could be turned into desirable additions to their local economy.

"2. Whether the people in the towns would welcome light industrial operation of the sort we had in mind (and we are always careful to describe in detail to community leaders the hours, working conditions, training methods, and wage scales that would prevail).

"3. How many women actually would like to have jobs with us and whether their potential talents,

A LODGE HALL AT LITTLE FALLS . . .



AND A WPA BUILDING AT BEMIDJI

Old Building

family responsibilities, etc., would be compatible with such jobs."

One of the first things looked for in a town is suitable space. It is usually the company rather than the community that hits on the solution to this problem. On two occasions, the bankers in the town who were helping in the search have despaired, only to have Munsingwear suggest some building that was being carried as a dud on the bank's own books.

Other surprises have turned up on the "unknown human assets" side. For instance, one prosperous little town had to be passed up when it was discovered that, while ample numbers of women would like to work for Munsingwear, they nearly all preferred "white collar jobs" in the office.

In contrast, another community was almost passed by because a town father reported it had "more tarpaper shacks than any other town in the state—and not much else." But Tolg was impressed by the fact that practically every housewife in the place had a nice garden. Now most of them still have their gardens *plus* a weekly pay check because, as usual, he finally found a building in which the ladies, who confessed they'd like sewing jobs, could do it in a money-making way.

All these little plants stop work at 4 p.m. so the women will have time to shop and keep up with their family responsibilities. Also great pains are taken to see that any potential new worker's job won't conflict with the husband's views on the matter or the obvious needs of small children. One capable worker had to be discouraged from continuing her job; she was such a super-neat housekeeper that she was wearing herself out trying to do two jobs too well.

In another little plant town everybody is happy over the fact that a certain girl finally has a job—with Munsingwear. She is a swell gal and everybody likes her, but she was just too big in horizontal dimensions to work behind any of the town's store or restaurant counters. As a seamstress she has no trouble at all.

Keeps Community Informed

Many other such "tremendous trifles" help explain the productive efficiency of the ruralized plants. The company tries to keep in step with community events as any good neighbor should, and great care is taken to keep the local editor, merchants, and the folks in touch with anything in the plants that will interest or affect them.

As a long-standing policy, the first week's wages in a new town are paid in silver dollars to dramatize the new money being brought to the community. Advance care is taken to explain that Munsingwear rates may raise wage levels among commercial business in town. For instance, one little bank's own annual payroll has gone up several hundred dollars since Munsingwear came to town. But its deposits are way up; doubtful mortgages are being amortized; retail sales are up; old doctors' and dentists' bills are cleared up, and more kids are being sent to college.

On the other hand, Munsingwear saves the celebrative fanfare that usually accompanies the opening of a new plant in a small town until one year later. By then it feels there should be some evidence of whether there is really anything to celebrate. And there always is. Invitations to the ensuing open house are sent to the neighbors by the workers themselves, not by the management.

For example, St. Croix Falls, Wis., recently celebrated its grand opening one year after with a "Munsingwear Day" put on by the town folks, complete with special issue of the paper, whopping big dinner with a style show—and the whole shebang described in a broadcast from the spot by Cedric Addams, the Northwest's most celebrated radio personality.

On another occasion one little plant's full force worked an extra day for free and the company turned the day's payroll, at full overtime rates, over to the local Red Cross. At the moment the company is engaged in a different sort of community project. Since Munsingwear hires women workers almost exclusively, it is helping two of its plant towns look for small manufacturing industries that would largely employ male workers.

While harmonious and positive human relations are essential to Munsingwear's program, Tolg is quick to point out that such conditions are simply the "permissive factors" that help to overcome certain basic problems. With nine little plants (not counting the one in Arkansas) operating in rural non-industrialized towns, each one in quarters originally built for some other purpose, it is obvious that problems of maintenance, supervision, inspection, supply, and control would all be intensified. For example, most of the machines used are specialized and complex, some

involving nine needles operating simultaneously on one stitching operation. It costs some $200 to train a girl to operate the average machine, and four years to train a repair and maintenance man.

Since all raw materials for these branch plants are supplied by the Minneapolis home plant as well as all finished goods being returned for market shipment, the plant towns have been selected with a general eye to lining them up on direct-line transportation from The Twin Cities. At present there are three "strings" of plants—factory or "milk routes"—radiating out of Minneapolis. In addition to providing integrated hauls for the product trucks, these milk routes offer time-saving direct lines of travel for supervisors, inspectors, engineers, maintenance men, and others who must travel back and forth from home base.

Self-Contained Producing Units

Each branch plant handles sufficient volume so that it can specialize on one or two products and operate as a self-contained producing unit. Wage rates in the branches average slightly below those in the Minneapolis plant to offset the added cost of handling and other factors of branch operation. Since living costs are also less in the small towns, the differentials are agreeable both to the local townspeople and to the union. Productivity in the small towns is good and absenteeism low, so that with fair piece rates the local payrolls mount into impressive figures both for the worker and community.

This entire program has been worked out within Munsingwear's operation as a union shop. Its agreement with Local 66 of the Textile Workers Union-CIO provides that the company have a free hand to deal with the many initial problems of opening a new plant. However, once it is established, a business agent from Local 66 is introduced to the community leaders in the new town at a lunch and the company-union relationships are explained. The union is then on its own in establishing itself among the workers in the new plant.

Munsingwear makes no claims to pioneering in its ruralized operations, but its own good example, plus the pressure of similar problems, is encouraging widespread and growing adaptation of similar solutions.

Cluett, Peabody & Company now has plants making men's shirts and underwear in the iron range country of Northern Minnesota at Eveleth, Chisholm, Gilbert, and Virginia.

Strutwear Knitting Company has similar plants in the little Southern Minnesota towns of Glencoe (in an old municipal auditorium) and Redwood Falls.

Minneapolis Knitting Company has branched out to Janesville, Wis. (in the old town hall); Waterville, Wis. (upstairs over a bowling alley); and New Richland (in a reconverted garage).

Other examples dot the Midwest such as Cooper's branching out from Kenosha and Globe Knitting Company from Grand Rapids. Textron is doing precisely the same thing in rural New England communities.

Not all the companies are finding as smooth sailing as Munsingwear, but as they "get the hang of it" these and other "ruralizing" operations in the textile industry are discovering Tolg's "positive formula"—i.e., with cooperation all around, the "wasted assets" of both human skills and idle facilities in small towns can be turned into new and mutually profitable industrial operations.

MOST MODERN AND MOST EFFICIENT CARPET MILL IN THE WORLD . . .

Ruralization

It's the approach that was chosen by James Lees & Sons Company, which has decided opinions on ruralization—and is entitled to them

IT WOULD be a mistake to assume that industrial ruralization is synonymous with the conversion of schoolhouses, dance halls, and roller skating rinks into industrial installations. There are abundant examples of precisely the opposite conditions where the new and specially built ruralized plant is a paragon of all the improvements conspicuously missing in the home-office plant.

Munsingwear itself has a foot in both camps because its new full-fashioned hosiery plant at Rodgers, Ark., is as outstanding an example of the modern factory in the rural setting as are some of its northern branches examples of progressive methods amidst old-fashioned rural facilities.

But the Rodgers plant in its southern small-town environment is no freak. It has similar new industrial neighbors in other little Arkansas towns like Bald Knob, Searcy, Atkins, Conway, and Cotton Plant where modern buildings have been built of late to handle food processing, textile, woodworking, or shoemaking operations.

In many instances, particularly in the South, the cost of these new plants has been borne by capital accumulated in the community, and the existence of a modern factory has served as part of the inducement to get some large company to ruralize a part of its operation. There are some observers who take a dim view of this practice, claiming it obscures the more fundamental economic and social factors that should guide the location of a ruralized plant.

. . . IS WHAT JAMES LEES & SONS COMPANY SAYS ABOUT ITS BRANCH PLANT SITUATED IN THE BACK-COUNTRY HAMLET OF GLASGOW, VA.

Method No. 2: Build a New Plant

But of more enduring and indicative significance are the new factories being built and operated in small communities by companies whose ruralization program is as thoroughgoing, realistic, and illustrative of the "custom built plant" as is Munsingwear's in the area of "bringing the work to the worker and utilizing idle community assets in the form of already existing production space." For a comprehensive example of this new factory approach to ruralization, let's examine the case of the Lees carpet mills located in the back-country hamlet of Glasgow, Va.

No Longer an Experiment

Earl Morgan, vice-president of James Lees & Sons Company, has had years of first-hand experience with what is certainly exhibit A in how to start from scratch and end up with what is one of the most modern and efficient carpet plants in the world (see FACTORY, July, 1947).

In view of the fact that James Lees & Sons Company last year celebrated its 100th anniversary, its experiment in ruralization can hardly be set down to factors of youthful impetuosity. On the other hand, the experiment has now been in progress 15 years so the Lees management is entitled to some rather mature conclusions.

From 1846, when the original James Lees arrived in Philadelphia from Yorkshire, England, and established his little business, the company remained exclusively in the manufacturing of woolen yarn until 1927. In that year the yarn company branched out into the carpet weaving industry with the acquisition of three small carpet mills in the Philadelphia area. Their reasons were eminently practical.

The advent of the broad loom (hence the term "broadloom" carpet) had forced the consolidation of many former customers for carpet yarns, and many of the resulting merged companies were large enough to produce their own yarn.

But the Lees people soon found they had not solved much of their problem by acquiring three old multistoried carpet mills, each located in a congested industrial area. In short, they were faced with the same demand for a decision on what to do about the future of their plant facilities which now confronts so many other companies in virtually all branches of industry. But company executives had a better-than-average idea of what they were looking *for*, and they had Earl Morgan, who, not disrespectfully, might be called an industrial bird dog with a nose for human equations.

It is worth noting that it was the bleak days of 1933 that Lees made a decision to build a brand-new plant, and Morgan set forth to find an ideal "ruralized" site for it.

Even he admits that his current hindsight with 15 years' perspective is better than what he originally conceived as what he was looking for. But even so he had a strikingly practical approach. His formula, worked out in long discussions with the company management, was "3 R's and a P"—roads, railroads, rivers, and people:

Roads—to give workers access to a ruralized plant without having to live near the plant in an "industrial slum." A first tenet was that the new plant was *not* to change the natural social environment of its community.

Railroads—to bring raw materials (Lees uses for-

eign wools exclusively since they are better suited to carpet-making than are domestic wools) and to distribute finished products. A roll of finished carpet may weigh over 500 pounds before being cut into "rugs."

Rivers—to provide necessary waste disposal. (Although the new mill uses wells as its water *source;* and all waste water is first rendered "innocuous" before being drained off into natural streams.)

People—as "the last shall be first," so it is with Morgan's formula. The Lees management was convinced that regardless of how neat a combination of "R's" they could find, the ultimate success of their experiment would depend on the people who would animate the new industrial plant—both as workers and as local management.

While not concerned with existing skills, Lees was in search of people who had *potential* skills as industrial workers and who had these potentialities embedded in more basic characteristics of personal, family, and community stability, pride of craftsmanship, and a fiber of principles to live and work by, whether inside a factory or out.

Uncovered 104 Potential Sites

While the search ended with people, it began on a map. Morgan adopted as a practical expedient the simple process of charting all places in a long list of states where *railroads* crossed *rivers.* This process soon netted 104 potential sites.

By a combination of personal travel and secondary research this list rapidly came down to ten and later to six locations on which the company actually acquired options. As a commentary on Morgan's research, five of these sites are now occupied by other industrial plants and on the sixth the Lees Company has its own modern carpet mill—at Glasgow, Va., six miles from Natural Bridge near the lower end of the Shenandoah Valley.

Except for the 17-acre plant which sits on a broad bench of meadow at the foot of a mountain, the town of Glasgow still looks the way it did 14 years ago when Morgan first saw it. Although the annual payroll this year will be well over $3,000,000, and the corresponding measures of economic prosperity in the area are scarcely to be compared with the rural hard times that prevailed in Glasgow in 1934, the fundamental characteristics of the community and its people remain unchanged. How this is possible is the open secret of industrial ruralization as practiced by the "Blueridge Division" of James Lees & Sons.

In the process of observing the efficient, high-speed, mechanized activity proceeding round and round the clock on a three-shift basis in this ultra-modern plant, it is easy to overlook the fundamental factors that make it the industrial success story it is. These fundamental factors are *man factors;* the modern building and the new machinery are only mechanized translations of the underlying man-factors in the picture.

One of these man-factors (and one strongly emphasized by both Lees and Munsingwear) is the little matter of a management keeping its word. One of the weakest spots so far discernible in the practice of industrial ruralization is (1) the temptation for a company to "overpaint" the picture of what it plans to do when it brings a new plant to a small town, and (2) a tendency for the natives, and especially the local politicians, to "over-expect" what the arrival of an industrial plant will do for their community.

To prevent this element of "overdoing" from getting things off on the wrong foot in Glasgow, the Lees management began at the beginning with a policy of (1) making sure that they, the townspeople, and their future workers knew what the company policy and plans were; and (2) carrying out the policy and plans to the letter—and then some.

Protection for the Community

Two basic policies on which the company and the local people began their relationship were:

1. The company's growth and operation would never "over-saturate" the normal available labor supply of the surrounding area from which people could and would travel to work without having to change their place or way of living. The jobs were for the people already established and would not serve to attract outsiders who might overcrowd and alter the community and its patterns.

2. As the project grew, the supervisory positions would be filled on a promotion-from-within policy except positions that called for unique technical training or experience.

Now what about the payoff on these commendable sentiments?

Today the plant employs some 1500 people. All but a bare dozen of them are natives, and that includes top management and supervision, as well as working force. The very first man hired in Glasgow was the personnel director, Wert Faulkner, now plant manager with full authority and responsibility for all local operations in the plant. There is no "checking with the home office" every time someone turns around in Glasgow—a policy, incidentally, which defeats more decentralized plant operations than any other factor—at least so far as human relationships are concerned.

As a second evidence of living up to an agreed policy, less than a dozen new houses have been built near the plant in the 14 years of its operation. But the numbers of farmhouses that have been improved, the new houses built in the 35-mile area where the people already resided, plus their purchases of cars, furniture, fences, farm machinery, etc., out of carpet plant earnings—that is a long, long story. Workers' earnings, most of which are piecework after a worker is trained, compare favorably with going wages for all types of industry in the region.

There is many a step between policy and practice; and few instances where this is truer than in a ruralized industrial operation. Most of the Lees workers in the Glasgow plant are farm or village people. Few have ever had prior industrial experience. Almost half are women. Many travel distances up to 70 miles a day round trip. Yet wartime absenteeism was barely 4 per cent, including the swing shift.

Living in Peace and Prosperity

Here are some clues as to how the Lees Company lives both peacefully and prosperously by "doing in Rome as the Romans do"—or in this case as the Scots do, since the Glasgow area, appropriately enough, is largely peopled with Scots.

It is no surprise that Wert Faulkner, now plant manager, was formerly head of personnel. And when the "plant" consisted of an old schoolhouse where the original eight experienced "outsiders" were training the first local employees, Wert's personnel job had already begun. He spent most of his

time outside the plant leaning over fences or sitting on porches "chewing the fat" with folks. Today as plant manager he is still at it, in the plant and out.

Moreover, the plant and its workings are dinner-table and street-corner conversation throughout the county. "Everybody" has been in the plant—high school graduating classes, school faculties, women's clubs, Rotarians, Lions, Kiwanians, farm groups, and ministers. So, also, have hundreds of buyers, salesmen, and store executives from all over the country who travel to Glasgow to attend "clinics" on how carpet is made and how it can be sold. A bulletin board keeps the workers informed as to who their visitors are at any given time.

In the personnel office, the homes of all workers are plotted on a big map. When more workers are needed and a certain area looks as if it has less than its share, a druggist, a banker, a preacher, or some other "unofficial member of the personnel department" in that community is asked to suggest people who would be interested and suitable.

On the other hand, when some youngster gets the urge to leave school and go to work, this unofficial personnel system goes into reverse to check up on the wisdom of the idea. If a family's economic problem is involved, maybe the mother or some other member of the family group can better become a breadwinner until the boy finishes school.

Family economic and social affairs are also taken into account in the plant. Workers can schedule time off to plant or harvest crops, butcher cattle (or even go hunting); and, if planned in advance, a fellow-worker may also be excused to help with the project.

Some readers might incline to the easy conclusion that this is another case of company paternalism. On the contrary, it is a realistic example of industrial democracy. More exactly, it is good common sense and company-community relations tempered with mutual respect. It is perhaps epitomized by the attitude of one Mr. Watts. As gatekeeper at the plant, he enforces the company rules agreed on by workers and management. As mayor of Glasgow, he also enforces the local laws which are also matters of democratic agreement. He has "pinched" Faulkner three times and fined him to the full extent of the law for such infractions as not having a dog license.

Ruralization involves people far more than it does machines or buildings

IT IS AN easy temptation, after having visited the Lees plant, or having toured one of the new Johnson & Johnson factories sitting back in park-like surroundings in a small New Jersey town, or after having heard in detail of the success of Munsingwear or Sylvania or some of the other bellwether companies, to hail the *ruralization* of industry as a panacea for all of the problems of industrial bigness, urban congestion, worker robotization, and other ills that our mass production economy has fallen heir to. But the successful ruralizers themselves have no such illusions. They are unanimous in warning observers and potential imitators that they have no "trick formulas" for getting results and that the process involves *people* far more than it does machines or plant structures.

Almost all participating companies speak of this ruralizing process as "bringing the work to the people," and most of their descriptive terminology about it is people-oriented. For instance, seven key executives in as many different companies, when asked about the ideal size for a decentralized plant, gave almost the same answer. It was that "the plant hadn't ought to be any bigger than one man could supervise and know all the people involved."

Another factor on which general stress is laid as being essential to success in a ruralized industrial operation is good community relations, beginning with the admonition to *be sure the community wants you in the first place.* In small towns the folks want to know much more about the company and how it's doing than in a big city. For instance, a rumor that one company was thinking about closing its local plant was completely squashed when news got around that the manager had just ordered the coal bin filled up.

All of which brings up the vital matter of local pride *versus* absentee management. Local workers and townspeople alike are quick to resent any implication that everything that their plant unit does is decided by somebody in the home office. They have no objection to the company setting its own rules and standards on production and the like, but they expect the hometown plant to be its own boss in matters pertaining to being a good neighbor.

Watching with Keen Interest

Economists, sociologists, and others who take the long view are watching these initial trends of industry toward the small towns with keen interest but reserved judgment. They are impressed by how quickly an industrial plant and payroll in a small agricultural town shows up in terms of increased purchase of consumer goods, an upturn in home ownership, and a lessened tendency for young people to leave town.

But they are also watching for the bad examples of new "industrial slums" that in the past have grown up around factories, and they also want to see how ruralization will withstand an economic recession. Will the operations in the rural plant or the metropolitan home plant be curtailed first?

As matters stand today, one thing is certain. All over the country this process is proceeding apace—pushed by the need for new workers and for new and better facilities by individual companies, and pulled by the desire of many small towns for industrial activity and new payrolls. Some of these new ruralized industrial adventures are doomed to failure, but it is to be hoped that more and more of them will be guided by careful foresight and mutual cooperation between company and community. In this the examples and experience of the bellwether companies can stand the whole economy in good stead.

MAKING CHIP SALVAGE PAY AN EXTRA PROFIT

WARD RING • PRODUCTION AND PLANT MANAGER, THE WOODWARD GOVERNOR COMPANY, ROCKFORD, ILL.

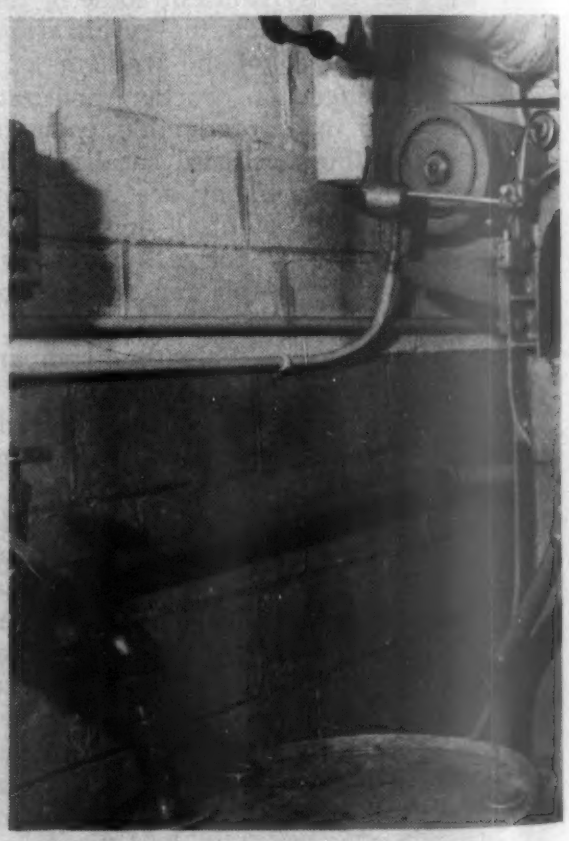
EVERY company salvages metal chips. It's profitable. But at Woodward Governor we make this process pay an *extra* profit.

This is how we do it:

Chips from machine tools are collected, then segregated and classified according to metal type. That means we get top prices for them. But before the chips are sold, we drain the cutting oil from them and, after reclaiming re-use what we can. The balance is not discarded or sold at bargain rates. *It is burned as heating oil.* That saves us 30 per cent on our fuel oil bills.

1 CHIPS ARE COLLECTED in these specially designed chip haulers. Large lip on each fits beneath bed

2 CHIPS ARE DRAINED of valuable cutting and lubricating oils in collection bins below this dumping station. Six of these stations are set flush in one plant wall. Chips remain in collection bins from 24 to 48 hours to drain them properly. Bottoms of bins are perforated to permit oil to drain into oil salvage system located in basement, which serves all six of the collection stations and bins.

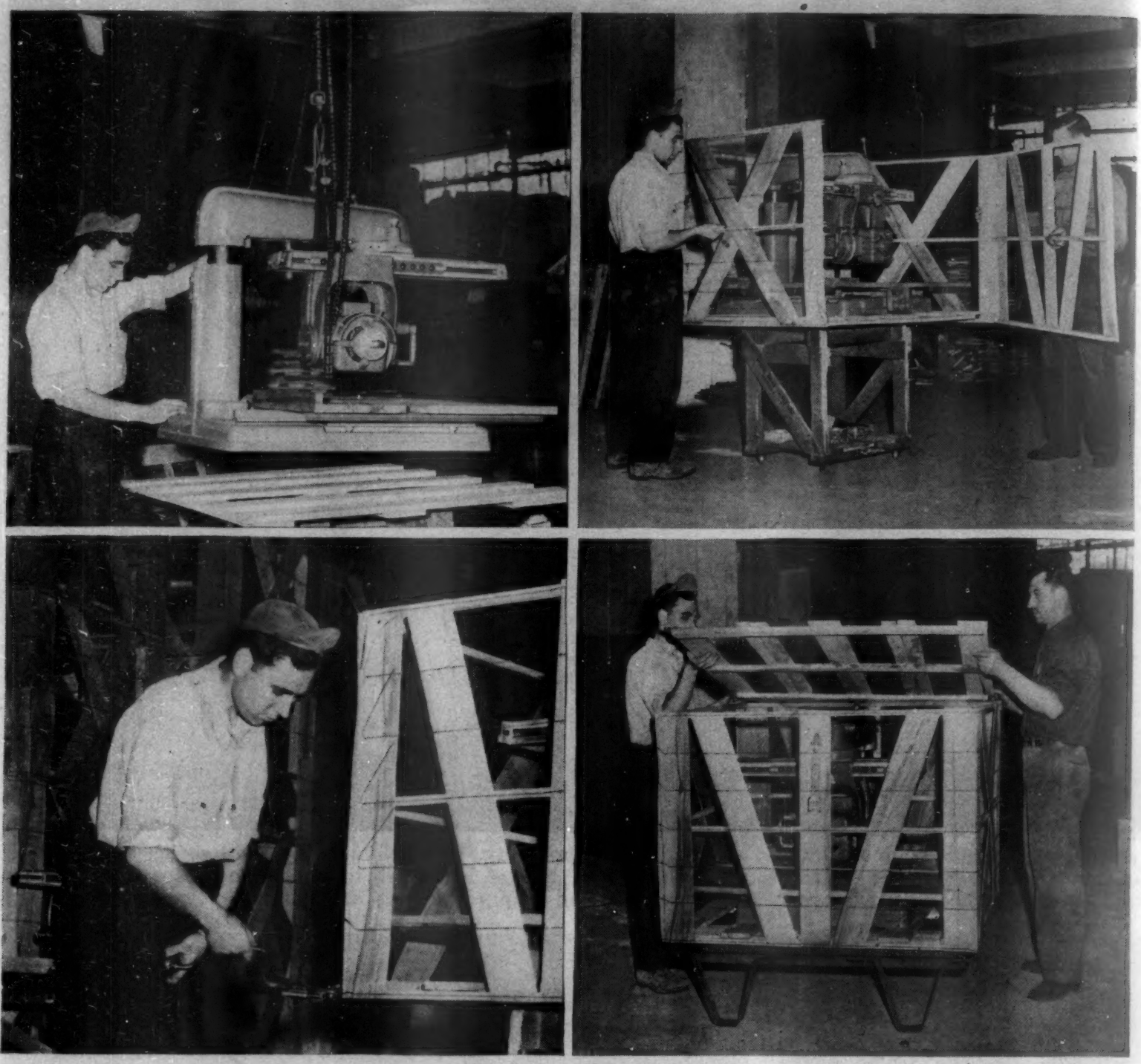


3 OIL IS SALVAGED in this basement room. Oil from bins drains into settling tanks (rear). After a few hours, oil is piped to centrifuge (center) where good oil is separated from water and foreign mat-

of almost every machine in the plant. Hauler is mounted on four wheels. Front wheels are rigid, rear wheels pivot for flexibility. Worker pulls chips from bed of machine to hauler. Roving chip collectors are kept busy seeing that machine tools and floors are free of chips at all times.

ter. Good oil flows to drum (left). Most reclaimed oil is used in the plant's oil burners for heating. Other valuable oils are re-used in the machine tools. Formerly, scrap buyers got oil with chips.

4 CHIPS ARE SOLD to scrap buyer who drives truck with special scrap collection unit. Bins have outside wall openings to facilitate chip removal. Bin door is opened, truck is backed to it, collection unit is dropped, and chips are loaded. Truck picks up unit and moves away. Buyer cut loading time in half with this system. Woodward Governor gets premium scrap prices, double value from oil.



FOUR SIMPLE STEPS reduce to a matter of minutes time required to crate even largest saws produced by Red Star Products. And the wirebound boxes now used have also helped make crating room cleaner, quieter

WIREBOUND BOXES CUT TWO-THIRDS

Used to take two men to build 20 crates a day. Twenty wirebound boxes can be prepared in a matter of minutes

R. G. CAOUETTE • GENERAL MANAGER, RED STAR PRODUCTS, INC. NORWALK, OHIO

THE whining of saws and the pounding of hammers in the Red Star shipping department have been silenced by the simple process of changing to wirebound crates.

But even more important than the quietness and shipping room orderliness is the fact that adoption of wirebound shipping crates resulted in tremendous dollar savings. The switch from home-made crates to wirebound crates slashed shipping cost about two-thirds. Specifically, there has been a saving of about $1.37 per package in material and labor costs, and 77 cents per package on freight charges (as a result of the relatively light weight of the wirebound container).

This represents a total saving of $2.14 per package that was actually shown in black and white. Additional savings resulting from elimination of waste, the elimination of shipping room noises, and other "intangibles" were not computed, but

STURDINESS is a prime feature of the lightweight wirebound boxes. Even crates containing the 465-lb. saw can be stacked without fear of collapse. Labor and shipping cost has been cut two-thirds, or $2.14 per crate

OFF PACKING AND SHIPPING COSTS

we believe them to be considerable.

When the crates were made by hand, two men were kept busy in crate-making alone. One man could cut the lumber for about 20 crates a day. Another nailed them together. Additional labor was required to pack the saws into the heavy and quite cumbersome crates.

With wirebounds, preparing 20 shipping crates is but a matter of minutes. We receive them from the crate manufacturer completely fabricated, except for final assembling, to fit each of our four models of saws. They come to us with the four wirebound sides in one piece, flattened so that they stack easily in a minimum of space. The specially designed bases and tops are bundled separately, and also stack economically and easily.

In packing, a saw is placed by hoist on the tailor-made crate base, and fastened to it with four bolts. One man folds the flattened wirebound "mat" into shape to form the four crate sides, and places it in position, so that its end cleats engage and support the base. The five binding wires are then engaged and twisted with a special tool to effect a firm and secure closure. After accessories are placed in the crate, a weatherproof bag is placed over the saw and the top of the crate is placed in position and fastened.

We have found that the wirebound crate makes a strong, sturdy package that stands firm under the most trying shipping conditions. Even crates containing our 465-lb. saws are stacked without fear or danger of collapse or damage.

1. ACTUAL DATA ON REPAIR COSTS

A YEAR	B KILOWATT-HOURS (MILLIONS)	C MAN-HOURS OF REPAIR LABOR (THOUSANDS)	D DOLLARS OF REPAIR MATERIAL (THOUSANDS)	E REPAIR LABOR INDEX (HOURS)	F REPAIR MATERIAL INDEX (DOLLARS)
1932	1.40	56.5	32.1	40.3	22.9
1933	2.11	92.0	59.7	43.7	28.3
1934	2.58	110.0	61.5	42.7	23.8
1935	2.95	126.0	63.2	42.7	21.4
1936	3.57	160.0	79.8	44.8	22.3
1937	3.85	144.0	76.7	37.4	19.9
1938	3.18	112.0	58.5	35.2	18.4
1939	4.90	194.0	110.7	39.6	22.6
1940	5.85	196.0	126.8	33.5	21.7
1941	7.55	289.0	219.2	38.3	29.0
1942	7.75	332.0	190.8	42.8	24.6
1943	8.45	375.0	166.4	44.3	19.7
1944	10.70	383.0	221.1	35.8	20.6
1945	11.55	348.0	308.6	30.0	26.6
		Average, 1932-1945		39.4	$23.0

2. THEORETICAL VS.

YEAR	THEORETICAL REPAIR COST
1931	3.38
1932	3.56
1933	4.45
1934	5.65
1935	6.25
1936	8.58
1937	9.97
1938	8.96
1939	13.3
1940	15.2
1941	20.8
1942	24.5
1943	26.8
1944	40.4
1945	47.3

Average per cent of theoretical.....
Average deviation from the mean.....

TABLE 1. Maintenance requirements at General Aniline's plants are forecast by applying the known-to-be-constant ratios of man-hours of repair labor to power consumption and dollars of repair cost to power consumption. The comparison, in TABLE 2, of actual and theoretical repair costs (as derived by the ratio formula) shows a

REPAIR COST BUDGET BASED ON

DAVID E. PIERCE • CHIEF ENGINEER, GENERAL ANILINE & FILM CORPORATION, NEW YORK

A NEW method has been adopted by General Aniline for budgeting maintenance costs. It involves a simple algebraic formula that bases maintenance requirements on plant activities as revealed in power consumption. It provides a means for control of repair costs in all the company's plants.

The control of repair cost presents a threefold problem: (1) It requires a separation of that cost into its component parts; (2) it requires some standard of measurement for each of those parts so that each component may be appraised independently as a definite per cent of its own standard; (3) it should be possible to compare the actual over-all total repair cost for any desired period with a composite "theoretical" figure based upon the individual standards.

Obviously, the total repair cost in any plant is made up of dollars of repair material, of repair labor, and of overhead. The labor cost can be broken down further into man-hours and average pay per hour. The overhead may be expressed as a per cent of the labor cost. These factors then are the component parts to be evaluated. There is no difficulty in assembling such information on actual costs. The real problem is to find the standards of comparison to know whether those costs are good or bad.

Where to begin? Plant history over 10 or 15 years would seem to offer the most reasonable source of standards. However, since most plants show wide variations in personnel, rates of production, and other factors, it has been necessary to look for a common denominator that would be a true measure of

ACTUAL COSTS

ACTUAL REPAIR COST	PER CENT OF THEORETICAL
3.27	96.7
3.76	105.7
5.24	118.0
6.06	107.1
6.86	109.6
9.43	109.8
9.33	93.6
7.79	87.0
13.7	103.0
13.9	91.4
22.9	110.1
26.8	109.3
28.4	106.0
37.3	92.2
40.4	85.5

.....101.7 per cent
..... 8.5 per cent

3. CALCULATION OF REPAIR COST FOR MARCH, 1948

THEORETICAL COST:

FORMULA: $C = X(A + BY)$
in which

X = Power consumed (thousands of kwh.).....1200

A = Repair material index (1932-45, $ per 1000 kwh.).....$23.00

B = Repair labor index (1932-45, man-hours per 1000 kwh.).....39.4

Y = Average pay per man-hour (March, 1948).....$1.80
plus
Overhead per man-hour (80 per cent of pay per man-hour) $1.44

SUBSTITUTION:

$C = 1200 (\$23 + 39.4 \times \$3.24)$
= $27,600 (material) + $153,187 (labor and overhead)
= $180,787 (calculated or theoretical total cost)

ACTUAL COST:

		Per cent of theoretical
Material	$29,200	*106*
Labor and overhead	140,000	*91*
Total	169,200	*93*

remarkable consistency over a period of 15 years of rapidly expanding operations. TABLE 3 contains a sample calculation of the theoretical maintenance cost, as well as a comparison with the actual for the period. Once the indexes are known, substitution in the formula (shown at top) is a simple matter

POWER CONSUMPTION

plant activity in all those years. It has been found in the consumption of electric power. That is, it has been shown that for each of more than a dozen plants investigated, the consumption of each thousand kilowatt hours of electric power has been accompanied by a surprisingly constant ratio of repair labor-hours and of dollars of repair material.

Thus, from each plant's records for 10 or 15 years it has been possible to establish an average "repair labor index" (man-hours of repair labor per 1000 kwh. consumed) from which the average variation of individual yearly indexes is within plus or minus 10 per cent, despite increases in production as much as tenfold during that period. Likewise, for the same years the average cost of repair material has been represented fairly well as a "repair material index" (dollars of repair material per 1000 kwh. consumed).

The method of establishing these indexes for a typical plant of this company is shown in Table 1. In this table and all subsequent exhibits hypothetical figures have been used, but actual ratios and index values have been preserved. Column B shows the consumption of electric power in kilowatt-hours for each of the years listed in column A. For these years, column C gives the total man-hours of payroll labor used in repair and maintenance work. Column D gives the corresponding cost of the repair material used. Column E, obtained by dividing column C by column B, gives the repair labor index (as man-hours per 1000 kwh.). Similarly, column F is obtained by dividing column D by column B to give the repair material index (as dollars of repair material per 1000 kwh).

According to this tabulation, the plant increased its activity eightfold during the 14 years, based on its consumption of electrical energy. Repair labor-hours increased from 56,5000 man-hours in 1932 to 348,-000 in 1945 and the expenditure for

4. COMPARISON OF REPAIR LABOR AND MATERIAL INDEXES

DEPT.	THIS MONTH (March, '48)			THIS YEAR (3 Months)			YEAR 1947 (12 Months)		
	KWH. (THOUSANDS)	REPAIR LABOR INDEX	REPAIR MATERIAL INDEX	KWH. (THOUSANDS)	REPAIR LABOR INDEX	REPAIR MATERIAL INDEX	KWH. (THOUSANDS)	REPAIR LABOR INDEX	REPAIR MATERIAL INDEX
A	263	29	$24	757	26	$23	2570	29	$28
B	183	25	17	485	23	21	1630	28	28
C	158	35	32	438	32	29	1460	38	47
D	30	30	19	88	35	23	328	36	27
E	72	39	22	195	42	26	849	32	27
F	66	47	29	202	38	26	646	35	33
OTHERS	433	—	—	1315	—	—	4953	—	—
ENTIRE PLANT	1205	27	$18	3480	24	$19	12436	26.1	$25.6

TABLE 4. Standards for repair costs can be set up for departments as well as for an entire plant. Above, six departments with widely diversified activities show characteristic uniformity in labor and material indexes

repair material increased from $32,100 to $308,600. Part of the reduction in the repair labor index for 1945 below the 14-year average is ascribed to improved control of work, and part to having certain work done by a contractor whose charges contributed to an increase in the 1945 repair material index above the 14-year average. All invoices for maintenance work by an outside contractor in any year were included as "Repair Material."

How were the indexes used in deriving standard repair costs for comparison? Returning to the original definition of total repair costs, a standard repair cost per kwh. would consist of the labor cost (labor-hour index x wage rate) plus material cost (material index) plus overhead (expressed as percentage of wage rate). Inasmuch as wages per man-hour were tripled during the 14 years, and since overhead was neither uniform nor under the control of the engineers in charge of repairs and maintenance, it was evident that these items had to be expressed as variables. The repair cost formula as finally established is shown at the top of Table 3.

This formula was applied for the period 1931 to 1945, using fixed values of a and b together with actual values of the variables x and y for each year. Table 2 presents a comparison of the annual theoretical report costs thus calculated with the actual repair costs. Actual costs averaged 101.7 per cent of theoretical, with the average deviation from the mean being 8.5 per cent. Maximum deviations occurred in 1933 when the actual cost was 18 per cent above theoretical and in 1945 when it was 14.6 per cent below the calculated amount.

The Repair Cost Formula

The erection of repair cost standards now becomes an easy matter. When a plant has established reliable indexes from past years, the repair cost formula can be used as a continuous budget for evaluating present performance. Use of current values of x and y permits comparison of actual versus theoretical costs for one month or for any number of months, as well as for a year. The results can be expressed as percentage of theoretical cost or in terms of actual dollars *versus* dollars that would have been spent on the basis of past performance. A sample calculation of performance *versus* standard cost for one of this company's plants is given in Table 3.

The use of kilowatt-hours as a basis of comparison of repair costs is not limited to entire plants. Table 4 shows its application to six departments in another of the company's plants as well as to the whole plant. It will be evident that considerable variations may be expected in any department from month to month. However, unusual index changes are frequently of value in detecting abuses which might otherwise remain hidden. Conversely, the supervisor who is doing a good job can see the results promptly and quantitatively.

For anyone to conclude from this discussion that because the past history of so many plants shows relatively constant values for the repair labor index and the repair material index, there is no hope of making improvements, is to miss the point. Actually, after applying this control method it has been found possible to make important reductions in the indexes. Once the various factors can be measured and given individual study, it is to be expected that worth-while savings can be effected. This, after all, is the ultimate objective of the control of repair costs.

An abstract of the development of the method described here was presented recently by the author before the American Institute of Chemical Engineers and published in *Chemical Engineering Progress*, March, 1948.

HOW TO FIND OUT WHAT YOUR WORKERS THINK ABOUT YOU

• If management is to deal effectively with industrial relations problems, *it must have the answer to the question, "How do your workers feel about you and your company?"*

• Here are the tools and an explanation of the techniques with which any management can do this fundamental job

---

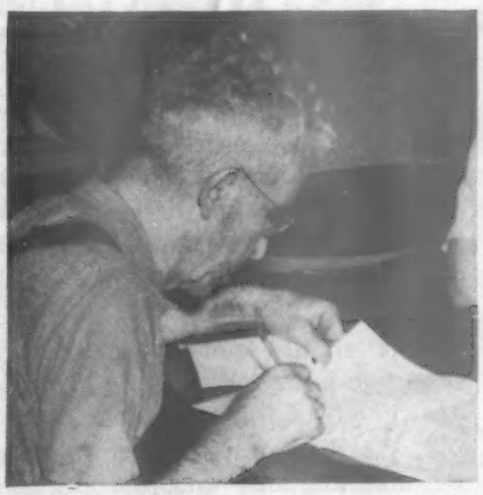
EVERY TOP EXECUTIVE, every manager, every superintendent, and every foreman worth his salt wants to know how he can improve human relationships within his particular company, division, plant, or department.

The attitude survey—modern version of the old maxim, "If you don't know, *ask*"—goes a long way toward providing a solution to that problem. If it cannot always tell exactly *how* improvements can be made, *it can invariably point to the areas in which improvements are needed most.*

In other words, attitude surveys are not a cure-all. They are more like a doctor's diagnosis. The prescription must then be filled and the dose administered if the patient is to improve.

In attitude surveys in industry, the employees make the diagnosis, and the management-patient, usually with the aid of statisticians to help in the interpretation, must write its own prescription.

An outstanding example of how this can be done, successfully, was



Standard Register's, 1400 employees provided the answers

provided recently by the Standard Register Company, Dayton.

Standard Register was by no means ill. But just as many a healthy businessman undergoes a routine physical check-up, the company decided to submit its practices, policies, and management personnel to a thorough examination by its employees.

The report of this examination, discussed in detail on the pages that follow, proved what was already suspected: *In its dealings with employees, the company is completely sound.*

A waste of valuable time and money just to get a clean bill of health? Standard Register doesn't think so. Because the examination also disclosed some *potential* trouble spots—minor blemishes, to be sure, which are easy to remedy today, but might become serious if neglected.

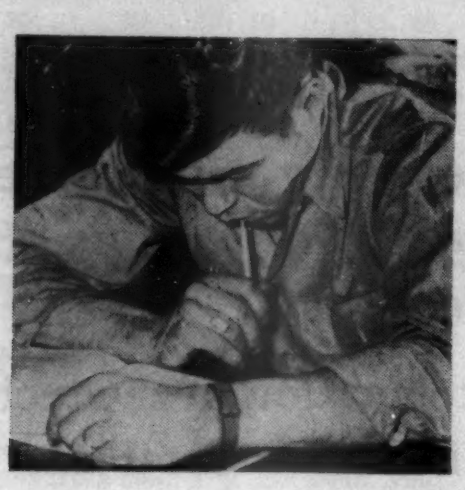
Making an adequate survey of employee attitudes is not a simple task. It requires a lot of planning. It requires a lot of courage to ask some of the questions that must be asked, but which may bring forth unpleasant answers. It requires a lot of painstaking analysis to find out just what the answers mean. Above all, it requires an honest desire to know the *facts* about your employee relations.

Standard Register combined those ingredients to produce a survey which FACTORY believes can well serve as a benchmark for other companies.

CONTINUED ON NEXT PAGE

Some puzzled over serious questions . . .

. . . others thought long and hard to find really honest answers . . .



. . . and even chewed up pencils while completing the questionnaire

60 QUESTIONS AND COMMENTS USED TO MEASURE EMPLOYEE ATTITUDES

"WHAT, SPECIFICALLY, do you want to know about the feelings, attitudes, and reactions of your employees?"

That is the first question that must be answered by any company undertaking an employee attitude survey. Not unnaturally, it was the first question asked by the professional survey group called in as consultants by Standard Register.

Eleven top executives, working with the consultants, determined that the survey should concentrate on finding out what employees thought about six phases of company operation:

1. The company in general.
2. Top management and how it handles its problems.
3. Divisional heads and how they handle their problems.
4. Supervisors and how they get along with their employees.
5. Employees' specific jobs.
6. The effectiveness of the company's employee relations program.

Having defined the "areas of opinion" to be explored, the next step was to formulate *specific* questions. A tentative list of several hundred was drawn up, and then each question was screened with these objectives in mind:

1. It should not require more than one hour for any employee to answer all of the questions.
2. Wording of the question must be unambiguous and in language any worker can understand.
3. Wording of the question must not suggest what management might believe to be a favorable answer (no "loaded" questions).
4. The "possible answers" provided with each question must give ample opportunity for an *accurate* expression of opinion by workers with all shades of convictions, ranging from enthusiastic approval to vindictive criticism of the company.
5. Broadest possible coverage should be provided by the range of questions selected.

To insure, however, that no employee was deprived of an opportunity to express a strong conviction because of failure to include a particular question, ample space was provided at the end of the questionnaire for "comments."

The resulting questionnaire is reproduced in its entirety on the three succeeding pages. Only one modification has been made. In the spaces that would normally be left blank for employees to check answers, FACTORY presents the plant-wide totals of the actual survey answers to the questions.

A description of the technique of administering the survey and analyzing its results begins on page 86

STANDARD REGISTER'S EMPLOYEE QUESTIONNAIRE

Below and on the two pages that follow are the 60 questions, together with the answers, asked in the survey. Over-all per cent of replies is shown in each case

1. What do you think of your job?

2% I do not like it
13% I am not very well satisfied
51% I like it pretty well
34% I am very well satisfied

2. What is your reaction to such social activities as the Christmas party?

1% Such things are a waste of time
8% They may be good for others, but I don't care for them
23% I think such activities are pretty good
68% I think such activities are excellent

3. How would you describe your supervisor?

4% He is a very poor supervisor
12% He doesn't know much about being a supervisor
54% He's a pretty good supervisor
30% He's the best I've ever worked for

4. What does your family think of your company?

1% They don't like the company
10% They don't care one way or the other about the company
74% They think it is a good company to work for
15% My family feels very close to this company

5. Do you feel you are given enough job training?

19% No, I do not
12% Job training is not very good
31% Job training is pretty good
38% I get all the training I need

6. Do you feel your top divisional head takes an interest in the welfare of the employees?

13% No, he does not
31% He doesn't seem to show much interest
38% He seems to take quite a lot of interest in our welfare
18% He is very interested in our welfare

7. What do you think of the suggestion system?

4% It is a waste of time to hand in suggestions
14% I think the suggestion system could be improved—see my comments
34% The suggestion system is handled pretty well
48% The suggestion system is a very good plan

8. Do you feel your job is important to the company's ability to produce a good product?

3% No, I do not
0*% I don't care whether it is or not
35% I feel my job is fairly important
62% I feel my job is very important

9. Does your supervisor treat you fair and square?

3% No, he never does
6% He is seldom fair
49% He is usually fair
42% He is always fair and square

10. In general, do you understand what your company's products are used for?

0*% I don't know anything about how they are used
4% I know very little about this
41% I have a pretty good idea how they are used
55% I clearly understand how they are used

11. Would you say your company is hardboiled and tough in its treatment of employees or is it thoughtful and considerate?

2% It is hardboiled and tough
40% It is about the same as most other plants
58% It is thoughtful and considerate

12. As a rule, is your supervisor patient and understanding?

2% He is always impatient and disagreeable
15% He is often impatient and disagreeable
51% He is usually patient and understanding
32% He is very patient and understanding

13. Do you take any pride in telling your friends you work here?

2% No, I do not
9% I take very little pride in telling them
43% I take quite a lot of pride in telling them
46% I am very proud to tell them I work here

14. From what you hear, would you say that the president and executive vice-president are well thought of by the employees?

2% No, I don't think they are
4% They aren't too well thought of
43% They are pretty well liked
51% They are very well liked

15. Every six months new employees are given a dinner, welcoming them into the company. What do you thing of this idea?

1% I think it is a foolish idea
2% I don't think it's a very good idea
26% It is a pretty good way to tell new employees about the company
71% I think it is a very good idea

16. Would you say your supervisor has the ability to make people want to give him their best efforts?

8% No, he doesn't know how to handle people
15% He knows very little about handling people
51% He is fairly good at handling people
26% He really knows how to handle people

17. Do you feel your company takes an active enough part in civic and community affairs?

0*% It doesn't do anything
6% It does very little
56% It seems to be quite active
38% It is very active in such affairs

18. What is your opinion of the recreation program?

1% It's a waste of time
14% It's not planned for all the employees, just for a few
44% I think it is pretty good
41% I think the program is excellent

19. What do you think of your working conditions?

6% They are very poor
22% They are just fair

** Less than ½ of 1% of all employees checked this answer*

QUESTIONNAIRE CONTINUED

39% They are pretty good
33% They are very good

20. Is there favoritism in your department?

10% Favoritism is widespread
19% There is too much favoritism
43% There is little favoritism
28% There is no favoritism

21. From what you have seen, would you say there is cooperation between the various departments?

21% No, cooperation between departments is very poor
23% There is just a little cooperation
45% Cooperation seems to be satisfactory
11% Cooperation is very good

22. Do you feel that this company does more from an employee relations standpoint for its employees than most companies in Dayton?

5% It does very little as compared to other companies
59% It does more than most companies
36% It does a lot more than most companies

23. Are you interested in being told what sort of a job you are doing?

5% No, I don't care one way or the other
95% I would like my supervisor to tell me every so often

24. Does your supervisor understand your job—does he "know his stuff"?

4% No, he doesn't understand my job
19% His knowledge isn't very good
46% He seems to know his stuff
31% He really knows his stuff

25. Who, in your opinion, is usually to blame when there are misunderstandings between management and employees?

5% Employees
21% Supervisory management
9% Top management
65% Both management and employees are to blame

26. Do you think your top divisional head knows what goes on in your department?

12% No, he does not
39% Not as much as he should
26% He knows quite a lot
23% He is fully informed

27. Your company feels that we now have one of the best group insurance programs in this part of the country—what do you think?

1% I don't like the program
17% The program seems to be okay
72% I think it is a fine program
10% Frankly, I don't understand enough about it to express an opinion

28. Do you believe that the security of your job depends on the company's ability to operate at a fair profit?

2% No, I do not believe this
12% It may have some effect
86% Yes, I believe a fair profit is necessary for job security

29. Does your supervisor criticize or bawl you out in the presence of fellow-employees?

3% Almost always
7% Quite often
35% Very seldom if he can possibly help it
55% Never

30. Do you feel it is worthwhile to constantly strive for better and more simple work methods in order to lower production costs?

5% That is something for the company to worry about
2% I can't see where it is worth while
26% I think it is quite worth while
67% I think it is very worth while and important

31. Do you thing the company does a good job in keeping employees informed on company business programs?

12% No, they never tell us anything
27% They give us a lot of information, but they don't make it clear and easy to understand
57% The company does a good job in keeping us informed
4% I am not interested in this kind of information

32. How do you feel your wages compare with those paid in other companies in this area for similar type of work?

26% My wages are lower
57% They are about the same
17% My wages are higher

33. How often have you and your supervisor talked about the various problems of your job during the past year?

13% We never talk about my job
37% Only once or twice
50% Quite often

34. From what you hear, what do the people of Dayton think of this company?

1% Most people don't like the company
6% Most people don't speak too highly of the company
50% Most people seem to think quite well of the company
43% Nearly everyone I know thinks it is a very good company

35. Do you like to read the company magazine?

2% No, I never read it
19% I seldom read it
16% I like it, but see my comments on how it could be improved
63% I like it very much

36. Do you feel your job offers you secure and steady employment?

5% No, I don't feel secure in my job at all
58% I feel fairly secure
37% I feel very secure in my job

37. Does your supervisor give clear instructions?

2% His instructions are never clear
15% His instructions are usually confusing
55% His instructions are usually clear
28% He always gives clear instructions

38. As a place to work, how do you think your company compares to other Dayton plants?

0% It is one of the worst plants in town
3% It is below the average
50% It is above the average
47% It is one of the best plants in town

39. Do you feel that the president and executive vice-president are really interested in making this company a better place in which to work?

1% No, they are not
5% As far as I know, they show little interest in this
47% They seem to be interested in this
47% They are very interested in this

40. Do you feel the company does a good job in creating a friendly atmosphere among the employees?

3% It does a very poor job
10% As far as I can tell, it doesn't do a very good job
53% It does a pretty good job
34% It does a very good job

41. Will your supervisor go to bat for you and back you up if something happens that isn't your fault?

7% No, he is only looking out for himself
4% He would seldom help me
49% The chances are he would help me
40% He would always back me up and help me out

42. Do you know in general what is done in other departments of the company?

9% No, I know about just the work in my own department
41% I understand what goes on in a few other departments
38% I understand quite a lot of what goes on in most departments
12% I have a very clear picture of the work of other departments

43. From what you know or hear, do you think your top divisional head is fair in his dealings with those who work under him?

9% No, I do not
7% Usually he is not fair
66% As a rule he is fair
18% He is always fair

44. Do you think the service recognition program (the awarding of pins and watches for length of service) is a good idea?

4% It is not a good idea
96% It is a very good idea

45. Do you feel that promotions are handled fairly?

17% No, you need "pull" to be promoted
17% As a rule, the person who deserves it is not promoted
57% The company usually tries to be fair in handling promotions
9% The company is always fair in this matter

46. When you go to your supervisor with a question concerning your work, does he take the time to give you a satisfactory answer?

3% No, he never does
15% Usually he is too rushed
42% As a rule he takes time
40% He always takes time and gives me a satisfactory answer

47. Do you think this company is well managed?

2% No, I do not
10% It is not very well managed
56% It is quite well managed
32% It is very well managed

48. In your opinion, should the plant cafeteria be continued?

91% Yes
9% No

49. Would you say that the president and executive vice-president are really interested in the welfare of the employees?

3% Not a bit interested
13% Care about us only to make more money for the company
57% Seem to be interested in our welfare
27% Are very interested in our welfare

50. What do you like best about working here?

51% It offers secure and steady employment
24% We have good working conditions
13% I get good wages
12% The chances for advancement are good

51. Do you feel that you can go to your supervisor for advice on personal problems?

11% No, he wouldn't be interested
17% He would show little interest
40% He would usually try to advise me
32% He would always try to help me

52. Do you understand who your boss is, and who his boss is, and so on up the line to top management?

3% I know nothing about that
10% It is pretty confusing to me
43% I understand it fairly well
44% I understand it very well

53. Would you know the president and executive vice-president if you saw them?

7% No, I never have seen them
14% I might know them
79% I would know them

54. Do you feel that your company's first aid services are adequate?

5% No, they are not
16% They are just fair
49% They are good
30% They are excellent

55. Do you feel the company offers you the opportunity to get ahead?

11% Opportunities for advancement are very poor
22% It's pretty hard to get ahead here
53% The chances for getting ahead are fairly good
14% The chances for advancement are excellent

56. What do you think of the discipline in your department?

8% It is very poor; there's too much playing around
21% The discipline is just fair
48% It is quite good
23% It is very good

57. Do you think your company is trying to improve its methods of operation?

1% No, I do not
19% It is doing just a fair job
55% It is doing a good job
25% It is doing an excellent job

58. Do you think your top divisional head is qualified for his job?

5% No, he is not qualified
10% He is not very well qualified
52% He is quite well qualified
33% He is very well qualified

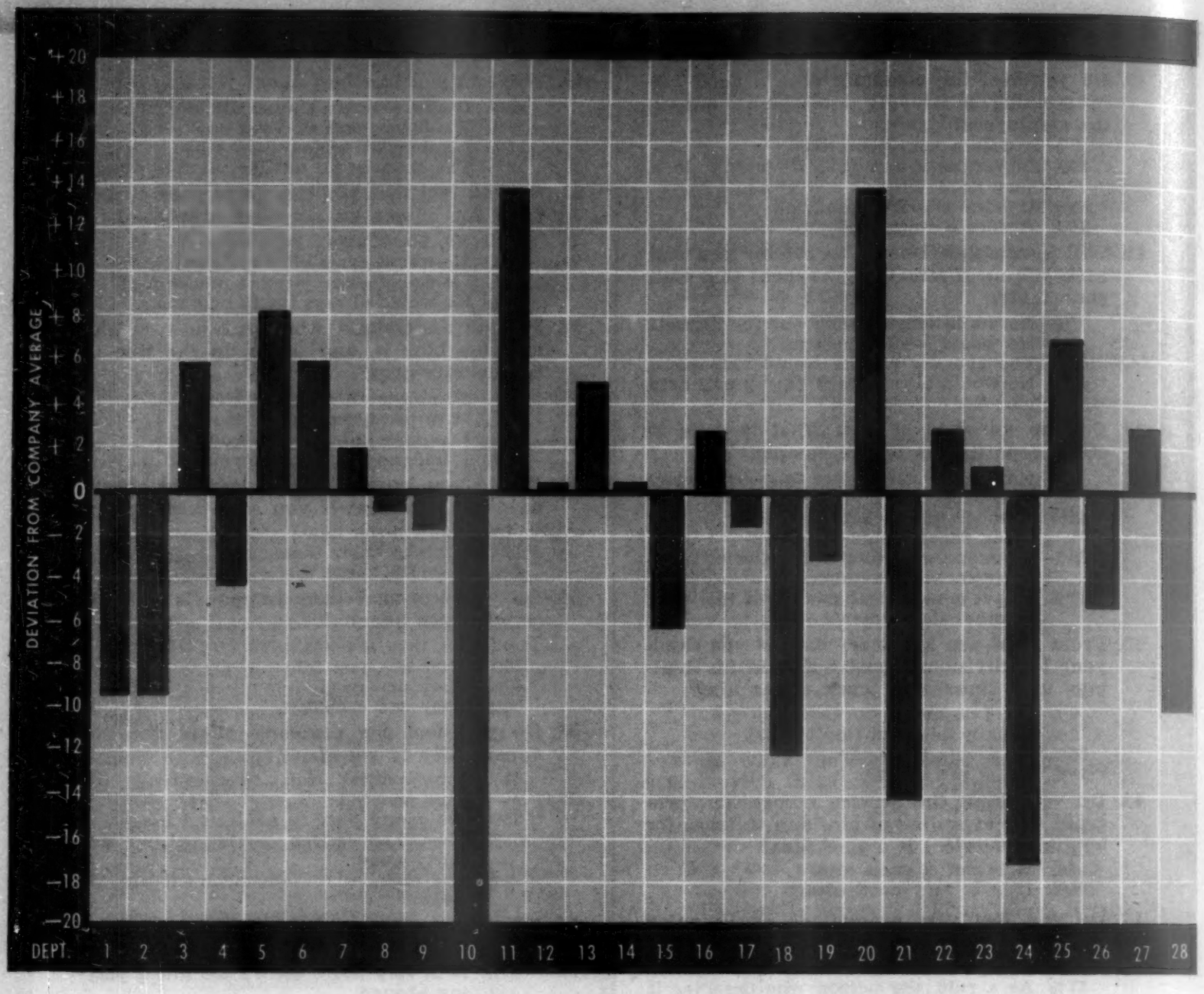
59. Do you feel your work is appreciated?

6% No one cares about my work
33% My work is appreciated just a little
47% My work seems to be appreciated quite a lot
14% My work is appreciated very much

60. In the absence of a company store, do the vending machines throughout the plant satisfy your needs?

31% Not at all
31% Only a few of my needs
24% Most of my needs
14% All of my needs

There follows a blank page headed "Comments."
81 per cent of employees used this page



DEPARTMENTAL REACTION TO

TO GET SOME IDEA of "over-all efficiency" of supervisors, response to six key questions was averaged in each department, and compared (in the chart above) with the plant-wide average of the answers to the questions repeated here:

Q. 3 "How would you describe your supervisor?"

Q. 12 "As a rule, is your supervisor patient and understanding?"

Q. 16 "Would you say your supervisor has the ability to make people want to give him their best?"

Q. 24 "Does your supervisor understand your job — 'know his stuff'?"

IMPORTANT VARIATIONS SHOWN

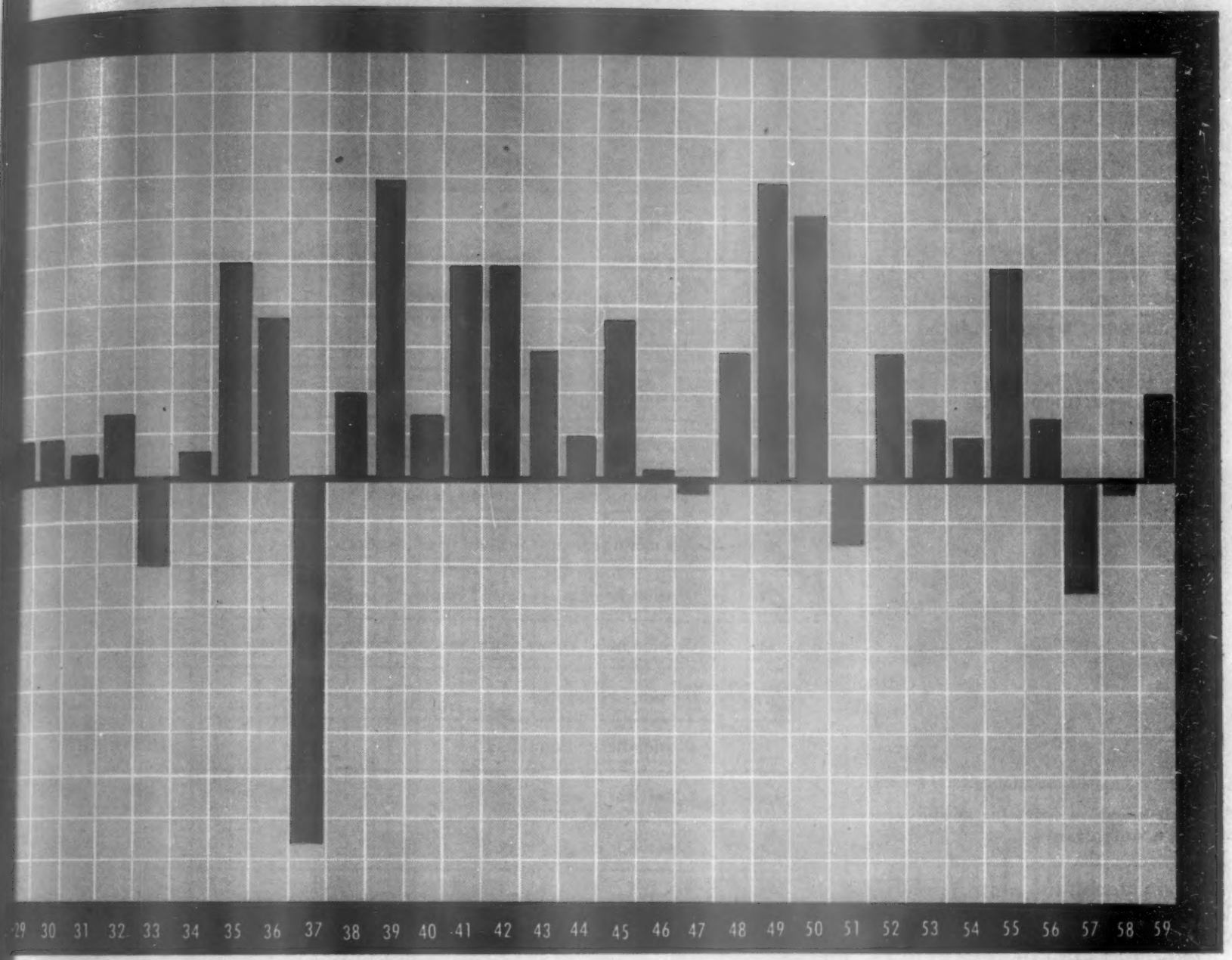
AFTER THE FINAL draft of the questionnaire had been completed, but before the actual survey took place, executives and representatives of the survey group met with supervision to outline the objectives of the survey and the actual conduct of it. Also a meeting was held with representatives of the several unions to make certain that they understood the objectives and purposes of the survey.

Almost all of Standard Register's 1400 employees answered the questionnaire in a single day. The one-hour sessions were scheduled to begin at 8:30 a.m., and continued until a half-hour past midnight. The entire operation was carried out on company time, with employees being paid their regular wages during their participation.

Everything possible was done to place the employees in a comfortable and relaxed atmosphere while answering the questionnaire. The auditorium was selected as the best location, because it permitted the handling of groups of approximately 200 with ample elbow room at chairs and tables. No interruptions were allowed during the session.

Certain definite steps were taken to explain the survey and its purposes to the employees:

1. A poster-size letter from M. A. Spayd, the company president, was placed on bulletin boards throughout the plant the day previous to the survey. This announcement explained, briefly, *what* would be covered in the questionnaire, and *why*



SIX KEY "SUPERVISOR" QUESTIONS

Q. 41 "Will your supervisor go to bat and back you up if something happens that isn't your fault?"

Q. 46 "When you go to your supervisor with a question concerning your work, does he take time to give you a satisfactory answer?"

EVERY DEPARTMENT was analyzed, to determine what makes a good supervisor, as well as to find out how supervisors lacking in favor with their employees could improve. But a record of only 6 out of 59 departments 10 per cent below average is good

IN ANALYSIS BY DEPARTMENTS

the survey was being made.The letter gave special emphasis to the fact that the returns would be anonymous, that employees must not sign the questionnaires. It also promised that each employee would receive a report, question-by-question, of the survey results.

The timing of the letter was important. To avoid possible adverse reaction from any impression that management was "springing" something on the employees, it was necessary that advance warning be given. On the other hand, an announcement too far in advance might give time for rumors regarding content of the questionnaire, or concerning the motives of management in arranging the survey.

2. When employees assembled in the auditorium to answer the questionnaires, a representative of the survey firm was introduced as a consultant, and he called attention to the fact that no members of management would be in the room during the survey period. He then proceeded to repeat substantially what had been in the president's letter.

Analysis of Replies

The job of interpretative as well as mechanical analysis was done by the professional survey consultants. Besides minimizing time and cost, this arrangement had the additional advantage of placing the burden of interpretation in the hands of a group not even remotely subject to any personal bias.

To provide data for the basic

analysis, employees were asked to classify themselves according to six "controls." They were:

1. Department.
2. One of four "length-of-service" groups.
3. One of three age groups.
4. Sex.
5. One of four wage groups.
6. One of three groups depending on working experience with other companies.

All answers were tabulated according to each of these controls. With isolated exceptions, the breakdown by departments was the only one which showed any significant

A tough question calls for some very real concentration

variation among the control groups. The departmental analysis, however, showed striking variations, both in the over-all picture, and on individual questions.

Consider, for example, the reactions of the employees in the various departments to six key questions relating to supervisors. The plant-wide percentage of "favorable" replies to these six questions was determined, and compared with the average in each individual department. The result is shown in the chart on pages 86 and 87.

What do these departmental variations mean? To determine the answer to that question, and then to correct any deficiencies, Standard Register developed a simple four-step formula: *Investigate. Weigh. Decide. Act.*

The first step, investigation, was a broad one. It began with a thorough analysis of each department's answers to individual questions. The results were prepared in the form of charts, similar to those shown at the right.

After examining the departmental charts for any patterns or trends, the investigation turned to the "comments" page of the ques-

CONTINUED ON PAGE 91

VARIATION OF TWO DEPARTMENTS

One of the principal dangers of attempting to apply broad-based statistics to localized problems is high-

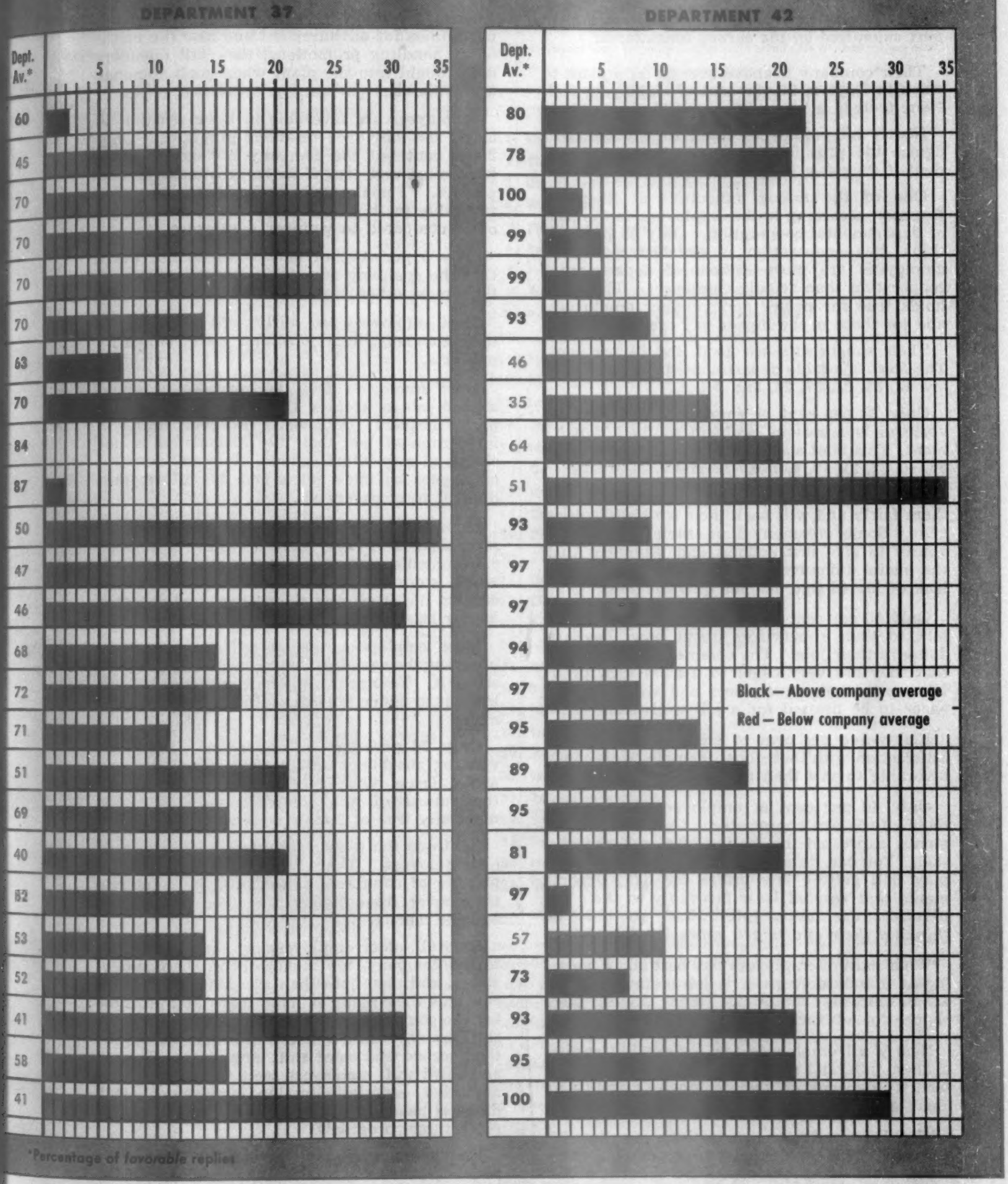
No.	QUESTION	Comp. Av.*
11	Company is thoughtful and considerate	58
31	Company does good job keeping us informed	57
38	Company better place to work than others	97
14	Top management well thought of	94
39	Top management interested in making company better	94
49	Top management interested in our welfare	84
6	Division head interested in employee welfare	56
26	Division head knows department problems	49
43	Division head is fair	84
58	Division head is qualified	85
3	Supervisor is good	84
24	Supervisor knows his stuff	77
16	Supervisor knows how to handle people	77
12	Supervisor is patient and understanding	83
41	Supervisor will back us up	89
46	Supervisor gives satisfactory answers	82
51	Supervisor will give personal advice	72
1	I like my job	85
59	My work is appreciated	61
36	My job offers security	95
55	Opportunity to advance is good	67
45	Promotions are handled fairly	66
19	Working conditions are good	72
32	Wages as good or better than other plants	74
20	Favoritism is not serious	71

*Percentage of *favorable* replies

IF A "PLANT" consisted of just the two departments analyzed above, the "plant-wide average" to the question, "Does your supervisor know how to handle people?" would be 72 per cent "yes." Yet the detail shows that in half of the "plant" only 46 per cent of the employees go along

SHOWS NEED FOR DETAILED BREAKDOWN OF SURVEY RESULTS

lighted in the charts below. Two similar departments in the same plant show a remarkable variation in replies to identical questions asked under identical conditions during the same day



with the 97 per cent in the other half who are sold on their supervisor.

In investigating departments 37 and 42, management had to tangle with a knotty question: Why should a "below average" department consider its division head "above average," and an "above average" department consider its division head "below average?" Yet that is only a sample of the tough problems Standard Register is trying to solve

DETAILED HIGHLIGHTS OF SURVEY ANALYSIS

The following excerpts are quoted from the report submitted by the survey consultants:

Their company is above average as a place to work in Dayton, 97 per cent of employees feel. None feels it is "one of the worst" plants.

Nearly all employees think they would recognize the president and executive vice-president if they saw them in the plant.

One of the major difficulties at Standard Register, according to the employees, is the lack of departmental cooperation. Only 56 per cent think this cooperation is satisfactory. Male employees are more critical of departmental cooperation than female employees. The same holds true for newer and younger employees, and for those in the higher pay brackets.

Their supervisors are good, say 84 per cent. The least favorable departments to this problem are 18, 34, 21, 37, 26, and 54.

Only 29 per cent of employees feel that favoritism is a serious problem in their department. This is of special concern to departments 33, 40, 37, 24, 10, 4, 5, 6, 7, 8 and 9.

Most employees think their supervisor treats them fairly and will back them up if difficulties arise. Some commented on their supervisor's ability to give instructions, and intimated that the main difficulty here was the supervisor's lack of knowledge, not his unwillingness.

Only 50 per cent of employees say they often talk to their supervisors about how they are doing in their jobs. The comments brought out that they are very eager to discuss such problems with their supervisors and they are also eager to be praised for a job well done.

Eighty-five per cent of employees expressed satisfaction with their jobs. Females were more favorable to this than males.

Only 40 per cent of employees do not feel their efforts are appreciated. One, in his comments, expressed the feeling of many when he said, "You can do a good job here, but you can play hell getting any praise for it." *Departments that reacted least favorably to their supervisors are, as a rule, least favorable in thinking their efforts are appreciated.*

What most of employees like best about working at Standard Register is job security. Next come working conditions, then wages, then chance for advancement.

Nearly all employees feel reasonably secure in their jobs, and nearly all of them think their security depends on their company's ability to make a fair profit.

Working conditions are satisfactory, say 72 per cent. This topic received considerable comment, with most comments being critical of ventilation, lighting, small restrooms, dust, dirt, and slippery floors.

Quite a number of employees criticized opportunities for advancement and also the method of handling promotions; they felt outsiders are brought into the plant when good openings are available.

Employees are favorable in their reaction to all of the employee relations programs. Only 2 per cent felt the company is "exceptionally hardboiled and tough" in its treatment of employees. Females are inclined to be more favorable in this than males; same is true for older compared to younger employees.

Only 5 per cent of employees do not think that the company does more for its employees than most other plants in Dayton.

Most employees are fairly well informed on their company, their jobs, and their company's products.

Most employees feel the company is doing a good job in keeping them informed of company business problems. However, quite a large number feel that the information is not clear and easy to understand. Male and younger employees are more apt to find this information difficult to comprehend.

Most employees like to read the company magazine. However, there are quite a number of comments concerning the magazine, most of which state that it lacks enough stories concerning the employees themselves, and does not appear regularly.

Most employees approve of the insurance program; however, 10 per cent do not understand it. Younger employees and females are less apt to understand than older employees and males.

Only 38 per cent of employees think that vending machines satisfy their needs. There are a large number of comments requesting the return of the company store. This is especially true of female employees.

Continue the plant cafeteria, say 91 per cent of employees. There are, however, a large number of comments concerning the cafeteria; they cover three topics: The food, the prices, and the management.

Over-all, older employees are more favorable to the company, top management, their supervisors, and their jobs than are younger employees, and they seem to have more appreciation for the company and what it gives them. First shift employees, in general, are more favorable than second and third shift employees. Second and third shift employees seem to feel they are neglected, especially by top management and division heads, and also in participating in the recreational programs.

Employees who have had many jobs elsewhere are more favorable than employees who have only worked at Standard Register or who have had only one or two jobs elsewhere.

tionnaire. Here were sought clues as to *why* of the results.

At this stage some points were no longer open to doubt—but others needed still more investigation. The next procedure, therefore, actually combined all four steps of the "formula" in greater or lesser degree. Department heads are being called into conference with top management to discuss results of the survey as far as the answers of his group were concerned.

At this conference, an attempt is made to suggest areas in which improvement could be made, and—very important—to give credit where credit was due. *And to attempt to gather more facts concerning those matters on which there is insufficient information to reach definite conclusions.*

The conference program is still under way as this article is written. When it has been completed and all the facts are available, the company's factory and office management councils will meet in formal session to attempt to work out a program aimed at correcting the weak points in supervision and in the over-all employee relations program.

Will anything really come of all this? One employee wondered:

"The same thing was done where I worked previously, but there it

The page for "free comments" was a startling idea to some

was used as camouflage. Employers had surveys made to try to convince employees that they were interested in what they were thinking. If a survey is put to a useful purpose, of course, it's a wonderful thing."

From all the evidence FACTORY could gather, Standard Register shares fully the feeling of this employee that a survey tucked away in an executive's desk is worse than no survey at all.

EMPLOYEES' "FREE COMMENTS"

Eighty-one per cent of employees used the comments page either to elaborate on their answers to the questions, or to express their thoughts on points not covered by the questionnaire. On the average, comments covered half of an 8½x11 page.

On the whole, women showed more interest in personal comforts, less in company problems. Male employees were far more vindictive in comments on their supervisors, and were apt to name names when the occasion arose.

Comments covered a wide field. Certain major topics were discussed by the employees in many departments. These topics were:

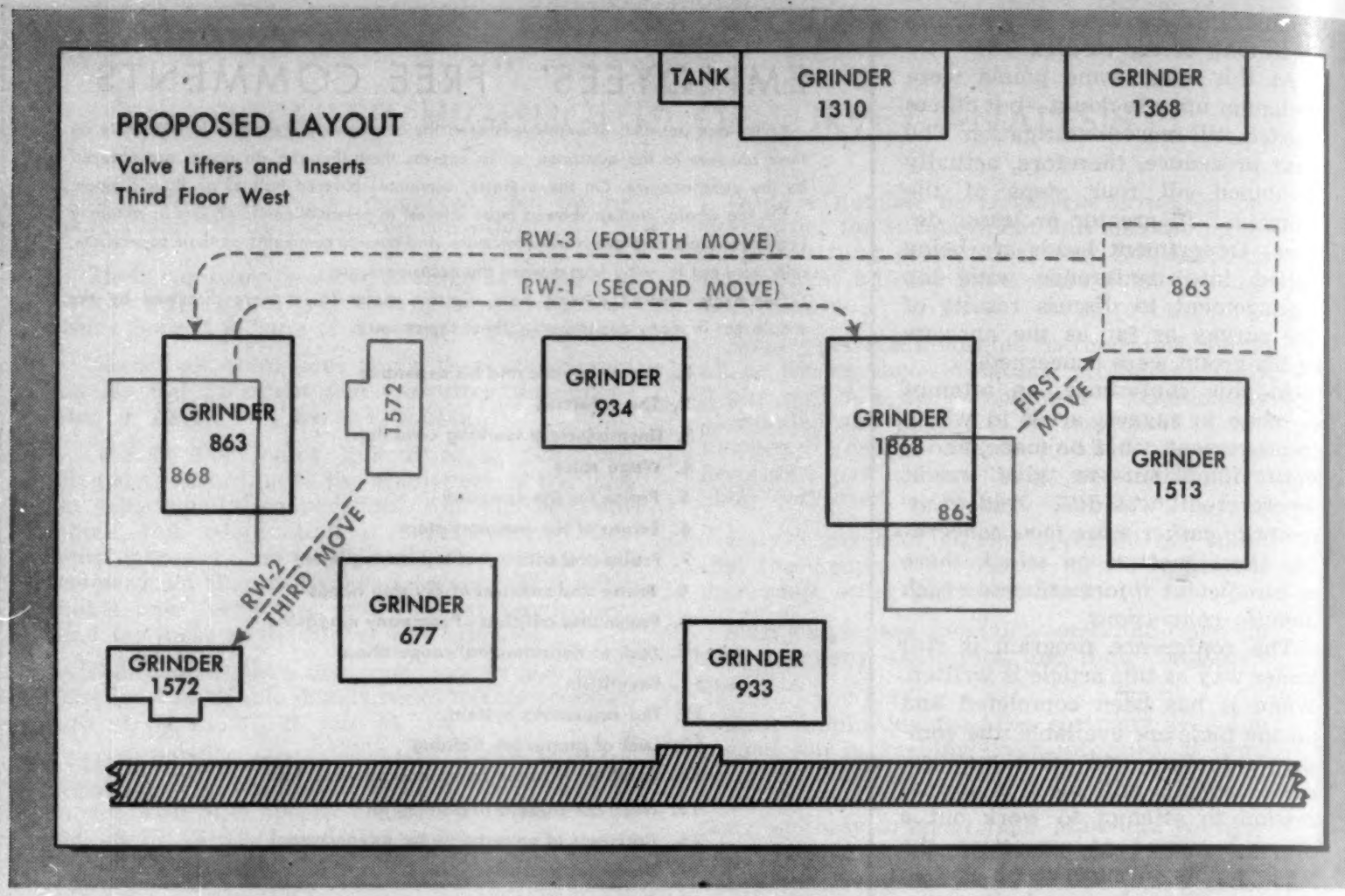
1. **The supervisor and his assistants**
2. **The cafeteria**
3. **Unsatisfactory working conditions**
4. **Wage rates**
5. **Praise for the company**
6. **Return of the company store**
7. **Praise and criticism of top management**
8. **Praise and criticism of division heads**
9. **Praise and criticism of company magazine**
10. **Lack of departmental cooperation**
11. **Favoritism**
12. **The suggestion system**
13. **Lack of proper job training**
14. **Complaints about being docked when late**
15. **Need for a guard in parking lot**
16. **Criticisms of opportunity for advancement**
17. **Desire for a pension plan**
18. **Criticism of equipment**
19. **The "new employee" dinner**
20. **Vacation policy**
21. **The "minute" system**
22. **Change of shifts**
23. **Service pin program**
24. **Attitude of company toward unions**
25. **Discrimination**
26. **Red tape**
27. **"Too many meetings"**
28. **Transportation problem**
29. **Women smoking**
30. **Working hours**
31. **Recreation programs**
32. **Social program**
33. **The incentive pay plans**
34. **First aid services**
35. **Company information**

and many detailed working problems

The greatest number of comments by employees concerned their supervisors. Some of these comments were critical of the supervisors' ability to handle people, their knowledge, their friendliness, their willingness to help employees, their willingness to answer questions, their authority, and favoritism. *Quite a number of employees expressed the feeling that there are too many supervisors.*

There were also quite a number of comments concerning the suggestion system. Criticisms generally fell in to one of three groups: (1) The system is too slow; (2) suggestions are not put into use; (3) none of the prizes are in the form of cash. Yet, despite these claimed shortcomings, 82 per cent of employees approved of the suggestion system at Standard Register.

The comment page was an open invitation to employees to air their personal "gripes." Recognizing this, the company rather anticipated that most comments would be highly critical (actually, many were not critical at all). The company's task became one of determining which criticisms were serious, which were "sounding off." The formula being used on every criticism: *Investigate. Weigh. Decide. Act.*



1. PROPOSED LAYOUT is shown in black on diagram delivered to plant engineer. He marks existing location (solid color) of machines to be re-located, shows route to follow and any intermediate locations (broken color)

MACHINE LAYOUT CHANGES

A. H. RANGER • PLANT ENGINEER, INTERNATIONAL-PLAINFIELD MOTOR COMPANY PLAINFIELD, N. J.

ALMOST every weekend is "moving day" in the Mack Truck engine plant at Plainfield. Changes are being continually required in machine layout to meet new production schedules or to make layout improvements.

Doing the moving without interference to existing schedules and without machine downtime is of first importance. Hence the choice of Saturdays and Sundays for this purpose. But it also means confining the job within that period and having the new layout ready for operation when the whistle blows on Monday morning.

Careful planning is involved. The time of the maintenance men must be kept as productive as possible, without needing to stop to figure out what's the next move. The tendency normally is to have too many maintenance men come in (at time and one-half) to insure completion of the job. And it can be avoided by a simple routine such as is applied at Plainfield, where cost and efficiency must be considered along with dispatch.

The order for layout changes at Plainfield emanates from the plant superintendent. It comprises an official order accompanied by a blue-on-white floor plan of the new layout (Figure 1) and two copies of an itemized list (Figure 2) of the machines and equipment to be moved or added. This is the starting point for the plant engineer to plan the actual moves and number of men needed to make them.

In the form received, the floor plan shows only the new layout. All machines are identified by name and equipment number. Relocated or new machines have landmark dimensions. The plan *does not show* the old locations.

Not later than the preceding Thursday the plant engineer and one or more assistants inspect the department affected. Using colored crayon, he marks in approximate outline the *existing* location of each machine to be moved. Then he traces the floor route over which each machine is to be moved. Consideration is given to aisle widths, overhead clearances, and other possible obstructions.

Next in order is preparation of detailed instructions to show the sequence in which the machine moves and intermediate work must be done (Figure 3). These instructions take into account any possible interference with one move by another. They make certain that floor spaces are empty before trying to put machines into them. The in-

March 17, 1948

New Layout - Dept. 34
Valve Lifters and Inserts

RW

1. Move 1868 to new location and connect electrically

2. Move 1572 to new location and connect electrically

3. Move 863 to new location and put up overhead

4. Move 873 to new loc... and put up overh...

R. Wakefield
Plant Superintendent

2. LIST OF MOVES is issued by plant superintendent, tells what is to be done, but not how

March 20, 21

Moving Orders — Dept. 34
Valve Lifters and Inserts

1. Make sure all aisles and machine areas are clear for moving

2. Move 863 into aisle and west about 10 feet to make room for R.W. #1 move. Remove overhead. Now R.W.-1 move

3. Move four benches for clearance for R.W.#2 move. Now R.W.-2 move Now R.W.-3 move

4. Move tool cabi... Now R.W.-4 m...

A. H. Ranger
Plant Engineer

3. MOVING ORDER tells how, and in what sequence, moves shown on proposed layout are to be made

MADE WITHOUT DOWNTIME

structions are written on a plain sheet of paper, as briefly as possible, and refer merely by item number to the plant superintendent's itemized list for machine moves. These items are not necessarily carried out in the original order of that list, but in the best sequence for efficient moving.

On Friday the foreman of the moving gang is given the marked floor plan, the plant superintendent's lists, and the plant engineer's written instructions. From them are figured the number of men needed, and any unusual equipment and tools.

Several tools have proved particularly helpful in speeding up the job. One is a utility air hoist and drum capable of moving machines up to 5 tons. It is mounted on a wheeled flat truck for mobility, and connected to a compressed air line wherever used. The truck is lashed to a convenient building column, and a rope block-and-fall is arranged and attached to the machine. The machine is always "skidded" for easier moving. Advantage of this hoist equipment is that it can be used in close quarters and can pull in any direction. The rate of speed can be controlled from 10 feet a minute to a whisper.

Another helpful tool has been the percussion-type gun for driving rivets, expansion bolts, and the like into steel columns, steel girders, or concrete surfaces. It saves 15 minutes of one man's time every time it is used. Exact location of accessory equipment that needs anchorage on floor, wall, or ceiling—such as switchboxes and hangers—is made easier as well as quicker.

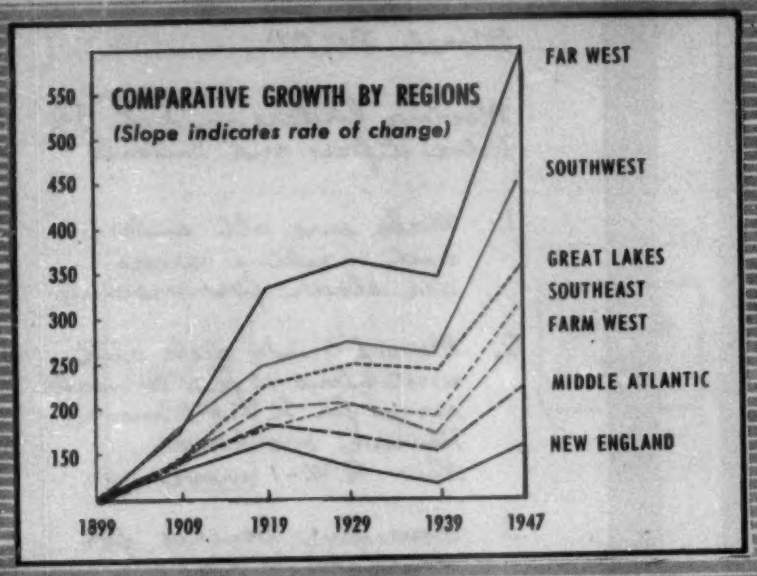
Importance of Planning

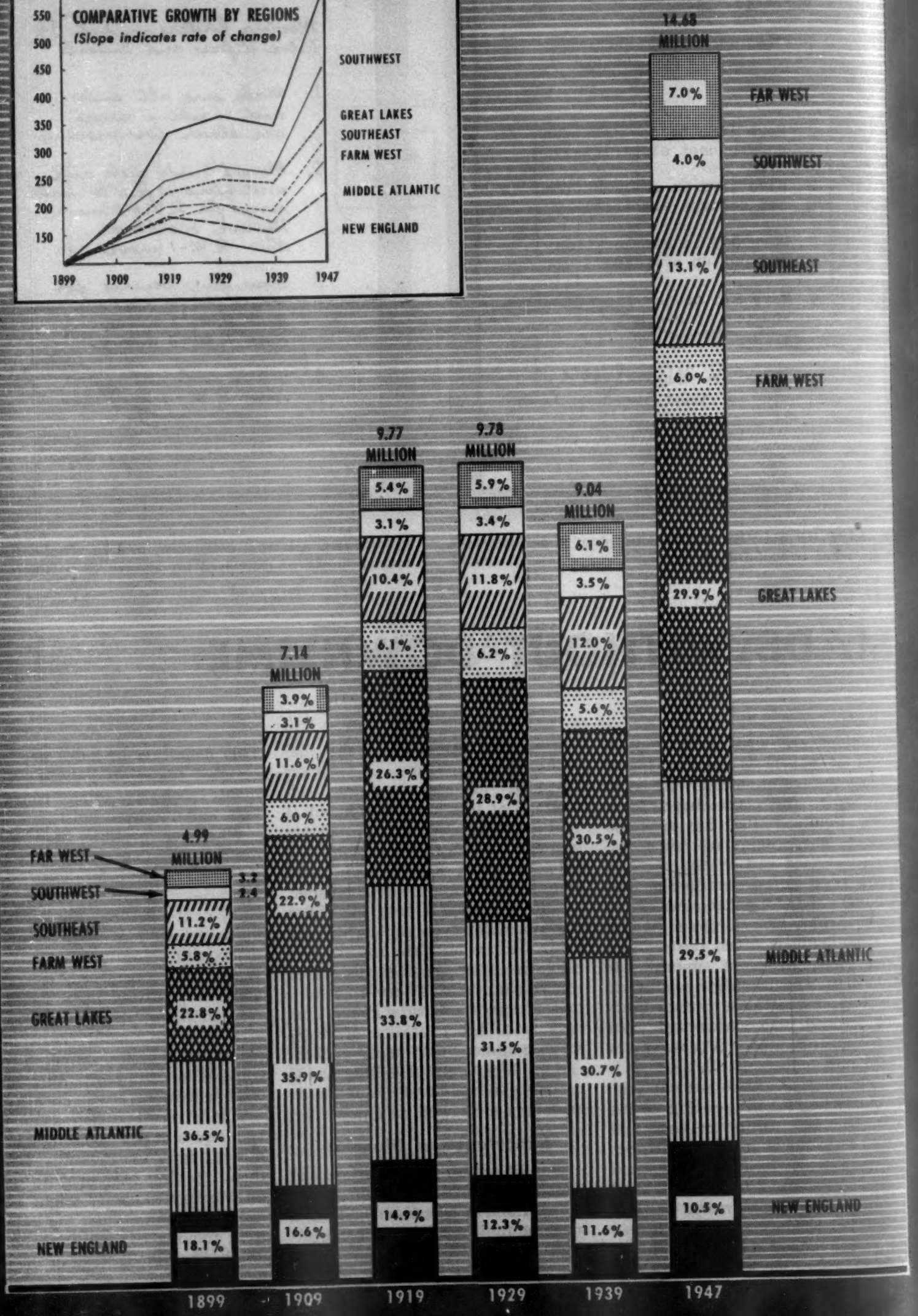
This brings up the importance of planning for installation of auxiliary equipment whenever making a machine move. No move is considered complete at Plainfield until the machine is ready to operate. This definition includes use of associated materials handling equipment, such as roller conveyors, lifts, and overhead hoists.

Wherever possible, such equipment is installed *prior* to the move if it does not interfere with current operations. Putting in accessory equipment before the weekend move means less rush during the move, and doing it at a lower cost. When first considered, it was argued that putting up a jack-shaft, for example, before the machine was in place would result in too many inaccuracies. Experience has proved that pre-positioning can be done consistently well in all cases.

It is a rare occasion when these techniques of pre-planning machine moves fail to deliver. Without them, the "ready-to-operate" signal on Monday morning might be the exception rather than the rule. As it is, moving day has just become another routine instead of the usual headache.

REGIONAL CHANGES IN FACTORY EMPLOYMENT, 1899—1947





THE FIFTY-YEAR RECORD OF INDUSTRY MIGRATION

It's a slow, slow process. More drift than shift. See chart of regional changes in factory employment (on facing page) . . .

But the change is plain. New England and Middle Atlantic states have been consistent losers over the years; Far West and Southwest, consistent gainers

FROM the time that the first linen mills, hat factories, and iron works sprang up around colonial Boston, New York, and Philadelphia, industry has been moving south and west.

New England was preeminent through the early 1800's. Then industry in the Middle Atlantic states began to grow—and grow faster than New England's. Next the Great Lakes states took over, making their great strides through the first decades of the 20th century.

Today, according to a study made by the McGraw-Hill Department of Economics, the West and the South are the new centers—and they are gaining now even faster than they did during World War II.

During the war, strategy dictated the locating of hundred of plants in new centers. Atlanta, Dallas, Kansas City, Des Moines—and farm belt towns with only tiny industrial operations—suddenly saw industrial plants sprout. Hampton Roads, Charleston, Mobile—and other sleepy southern ports—suddenly began to roar with the fevered pace of wartime shipbuilding. The Far West swelled with new aircraft plants and shipyards. Houston, Los Angeles, and Salt Lake City suddenly saw the smoke and new steel mills.

South and West Lead

But post-war construction shatters the wartime record in the South and West. One-half of all of today's new plants are going up in the South and West—which had only little more than one-fourth of all the pre-war plants. The New England, Middle Atlantic, and the Great Lakes states, which had 72 per cent of all U.S. manufacturing jobs before the war, got only 55 per cent of the new wartime plants built with private or government funds. And they are getting only 45 per cent of the new plants now.

When current expansion is completed, the nation will have boosted its factory capacity 50 per cent in a dozen years. The jump for the South and West, in a little over a decade, will be almost 100 per cent. The northeast regions have gained only about one-third. In other words, putting one-half of the over-all 50 per cent expansion of industry into the South and West has made the "new" industrial regions grow almost three times as fast as the old ones.

One thing is clear. Great as is the volume of new construction and impressive as is the share gained by the South and West, migration is a slow process. The movement is almost glacial, more drift than shift. Even with half of the war and post-war construction, the South and West will gain only a seemingly small increase in the proportion of all factory workers. A dozen years of accelerated migration will raise their share of factory jobs from 28 per cent to approximately 35 per cent.

Two "yardsticks" provide the over-all view and close-up measurements, where they are needed.

One is the money spent for new plant construction. It shows that the wave of migration that began before the war is in full swing and still far from complete. During the war—1939 to 1945—almost $10 billion of private and public funds were spent for plant construction.

By comparison, post-war construction totals only half as much. But many wartime plants cannot or will not be converted to civilian use. And post-war expansion still has at least one year to run. It's probably fair to say that post-war expansion, when complete, will add almost as much permanent new capacity as did wartime building.

The second migration "yardstick" is employment. The last full industrial census, 1939, provides one benchmark. A second is an analysis of Bureau of Labor Statistics figures on post-war factory jobs in 20 industries in the 48 states.

These figures show a shift of 3 per cent in the shares of total U. S. factory jobs from the Northeast to the South and West.

That 3 per cent figure actually reflects only the wartime shift because few new plants begun after V-J Day could have been completed and fully operating by the start of 1947. On that basis, the shift in employment during the war years checks the estimate based on construction figures which shows a shift for the complete war and post-war migration of 6 to 7 per cent.

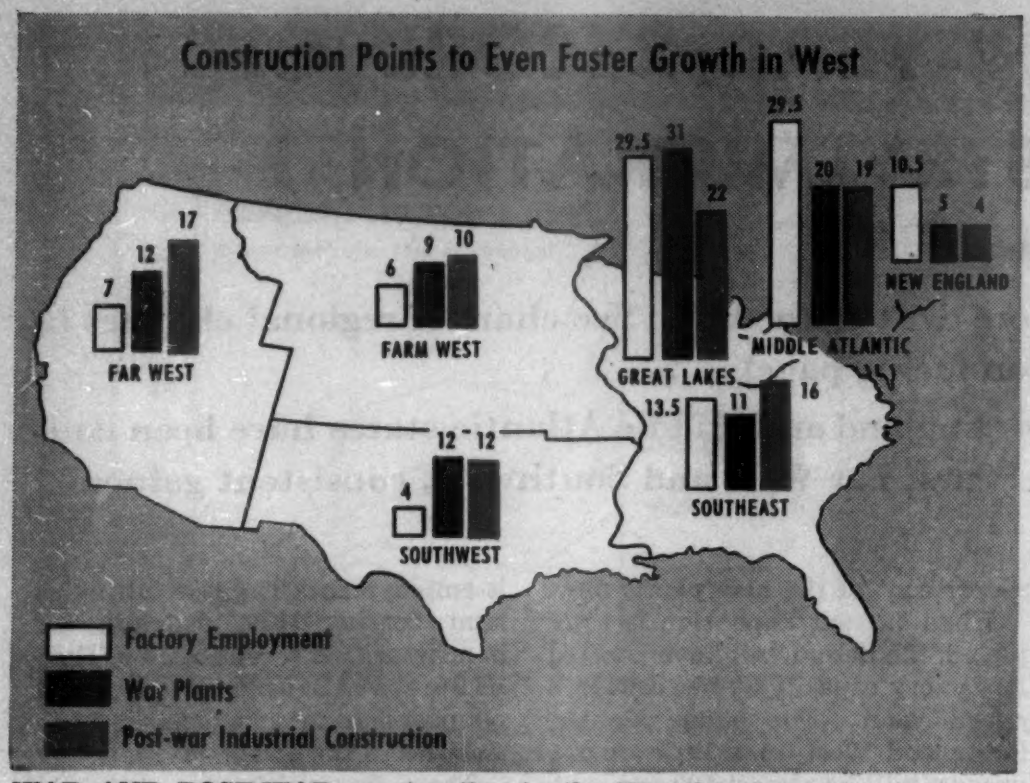
A striking fact emerging from a look behind the over-all figures is this: *Industry's movement from big cities to small is not as great as are the shifts among regions.*

Although the trend in industry's move to smaller cities is unmistakable, the shift is hardly as great as reported.

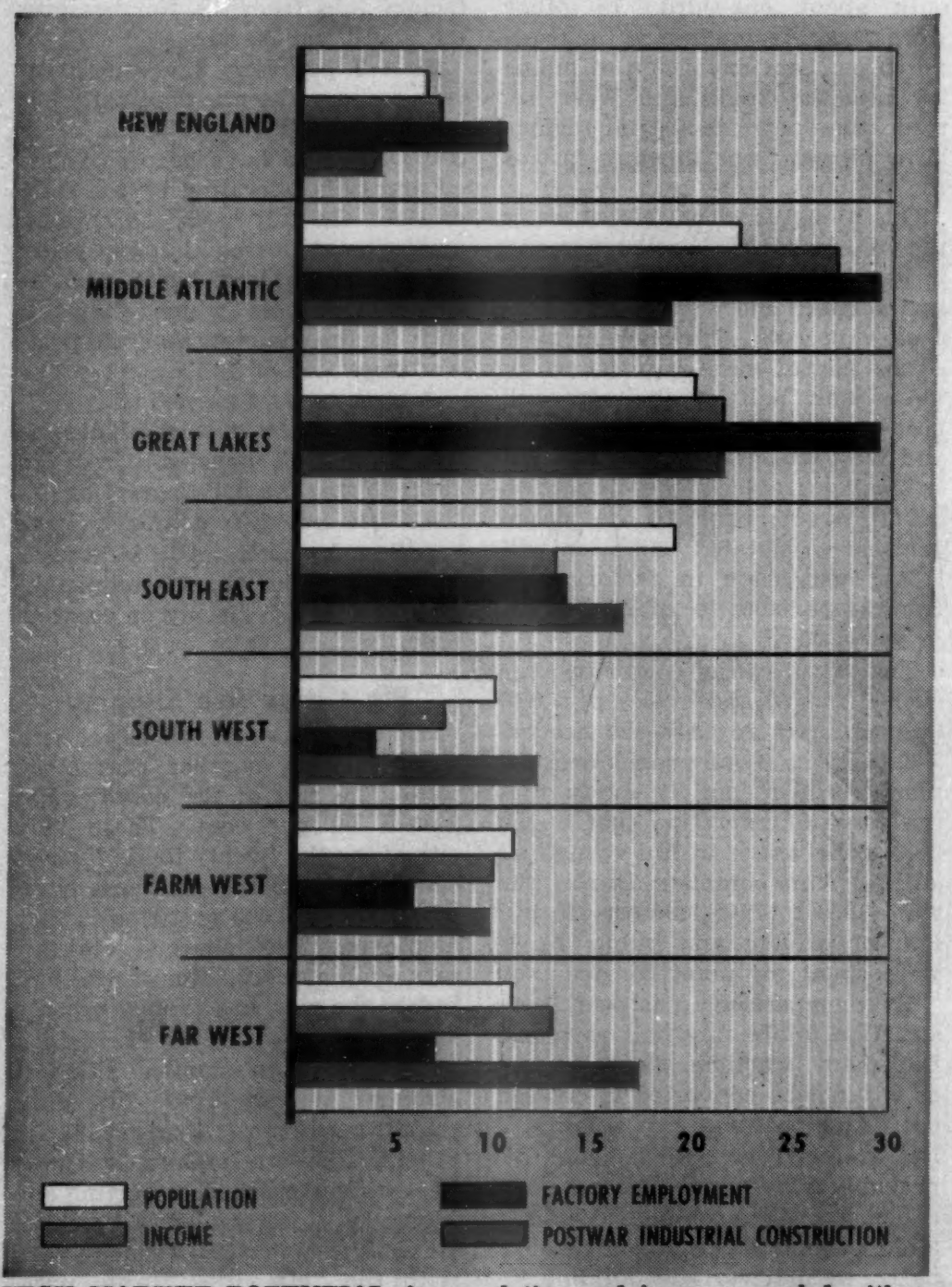
Big Cities Are Slipping

Big cities have gained 45 per cent since 1939 in number of factory jobs. The rest of the country has gained 50 per cent. These "big cities" are the twenty top industrial centers of the nation, those with more than 100,000 post-war factory employees. Their share of total factory employment, almost one-half before the war, has slipped by only 1 per cent.

The move to smaller cities is stronger in some lines, like electrical machinery, than it is in others, like steelmaking with its heavy investment. In reporting employment, too, smaller cities that lie close to major cities are included with the "big cities." And, naturally, many new plants are going



WAR AND POST-WAR construction in the West has been at a rate well ahead of the region's share of factory employment



HIGH MARKET POTENTIAL, in population and income, coupled with a relatively low employment ratio brings the biggest industrial expansion

into the "smaller" cities which are part of the metropolitan centers because there is little or no space for big new plants in the heart of the cities.

Decentralization to small cities, moreover, is frequently only a phase of regional migration. New plants in the West and South, for example, usually go into smaller centers because much of the area has nothing like the big cities of the Northeast.

Despite the figures, there is ample evidence that smaller cities have been industrializing *at a faster rate* than the biggest cities have. Over the last 50 years, the larger cities have held about the same share, almost half of total factory employment. But—the biggest centers have gained population faster than the smaller centers. So the small centers, with slower-growing populations, have been gaining industrially at a faster rate.

The most striking findings, when you look behind the totals measuring migration, are the regional gains and losses since 1939.

The Far West has gained most spectacularly. It has increased its share in 18 industries out of 20. Over-all, it has raised its share of factory jobs by 0.9 per cent. The Southwest's has gained in 15 industries, and has thereby raised its share of jobs 0.5 per cent.

The Big Losers

New England has had the sharpest losses. It has fallen behind in 15 out of 20 industries. Its share of employment has dropped 1.1 per cent—from 11.6 to 10.5 per cent of U. S. totals. The Middle Atlantic states are over-all losers; the Farm West, consistent gainers.

These shifts since 1939 extended the historical pattern. The Far West and Southwest are traditional leaders in benefiting from migration. The Southeast and Farm West states enjoy a slight, steady upward trend. New England, the oldest industrial region, has lagged most, with the Middle Atlantic states next, over decades.

The Great Lakes states, interestingly enough, have just passed their turning point. They are becoming losers, rather than gainers. Their share of U. S. industry grew unmistakably through 1929. If you adjust employment figures to allow for the low level of durable goods operations in the region in 1939, you can show that they were still gaining in the '30s. But the trend is clearly against them now.

PRODUCTION FLOW CHARTS

7. PAINT MANUFACTURE

PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH

In the manufacture of paint, both dry and liquid ingredients are used. The dry raw material consists of pigments and resins; the liquids include oils of various kinds, varnish, and thinners.

Bulk of the liquid raw material is brought to the plant by tank-car (1). It is then stored in an exterior tank farm and pumped in by remote control. The pumping mechanism (2) is located in a special area near the tank farm.

The varnish used in paint manuture is made at the plant. Varnish is made from hard resins and oils. They are placed in kettles and cooked (3), thinned, filtered, and stored in tanks.

Dry raw materials such as pigments and resins come in sacks, barrels, and, sometimes, metal containers. These ingredients, as well as special liquid materials in small containers, are stored in a special area (4).

Actual paint-making starts with the mixing of ingredients. Portable mixing tanks are taken to the scale pit end of the 35-pipeline system originating in the exterior tank farm. The mixing tank is placed under the end of the pipe on a scale; a switch is pulled (5) and oils, varnish, and resins are poured into the tank. Quantities are determined by weight.

The tank is then taken to the second floor and discharged directly into a ball mill. At this point the pigment, usually in 50-lb. sacks, is added to the batch (6). In the ball mill (7) the batch is given a preliminary mixing and then poured. This is a cylinder-type, overhead mill used for grinding all types of paint and enamel with the possible exception of white enamel.

The grinding operation is necessary to produce a paste of desired smoothness and intensity of color. Otherwise the finished paint would be coarse and impossible to apply. In some paint operations, not shown in chart, the liquids (called vehicles) and the pigments are placed in giant mixing tanks where the batch is given the preliminary mixing. The batch is then conveyed to mills of various types such as a roll mill (8). Each type of mill (i.e., Buhrstone, three-roll, five-roll Bramley, pebble, steel ball, high speed) produces a slightly different finish.

The next operation is thinning. The materials used in this operation (additional oils, resins, varnish, driers, thinner, etc.) are placed in mixing tanks (9). These tanks range from 50- to 600-gal. capacity. The large ones have individual motor-driven agitators. Portable mixers are used for the smaller tanks.

In the tanks, the thinning solution is mixed and then the ground paste from the mills is added. This entire batch is then thoroughly mixed.

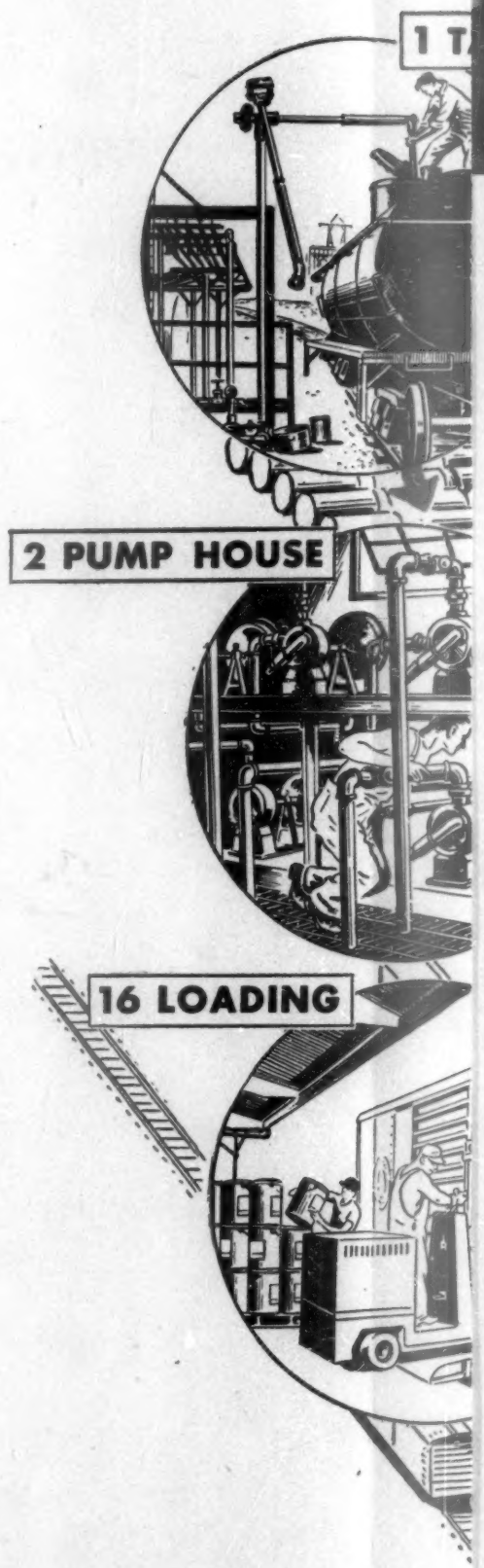
Following the thinning operation comes that of tinting the batch (10). The tinting mediums, in most instances, are colored pigments ground in special tinting vehicles to form paste.

Samples from each batch are taken from time to time and carefully checked in the control laboratory (11). Technicians check against established standards for color, brushing properties, drying, body, and many other factors.

After the batch is approved, it is discharged from the tanks through strainers (12) into hoppers which are connected with the filling machinery on a floor below where containers are filled automatically (13).

From the filling area, the packaged product is conveyed (14) to the shipping area where it is placed on skids (15) and loaded (16) into trains or trucks.

Power for the paint-making operations is obtained from the power house (17).



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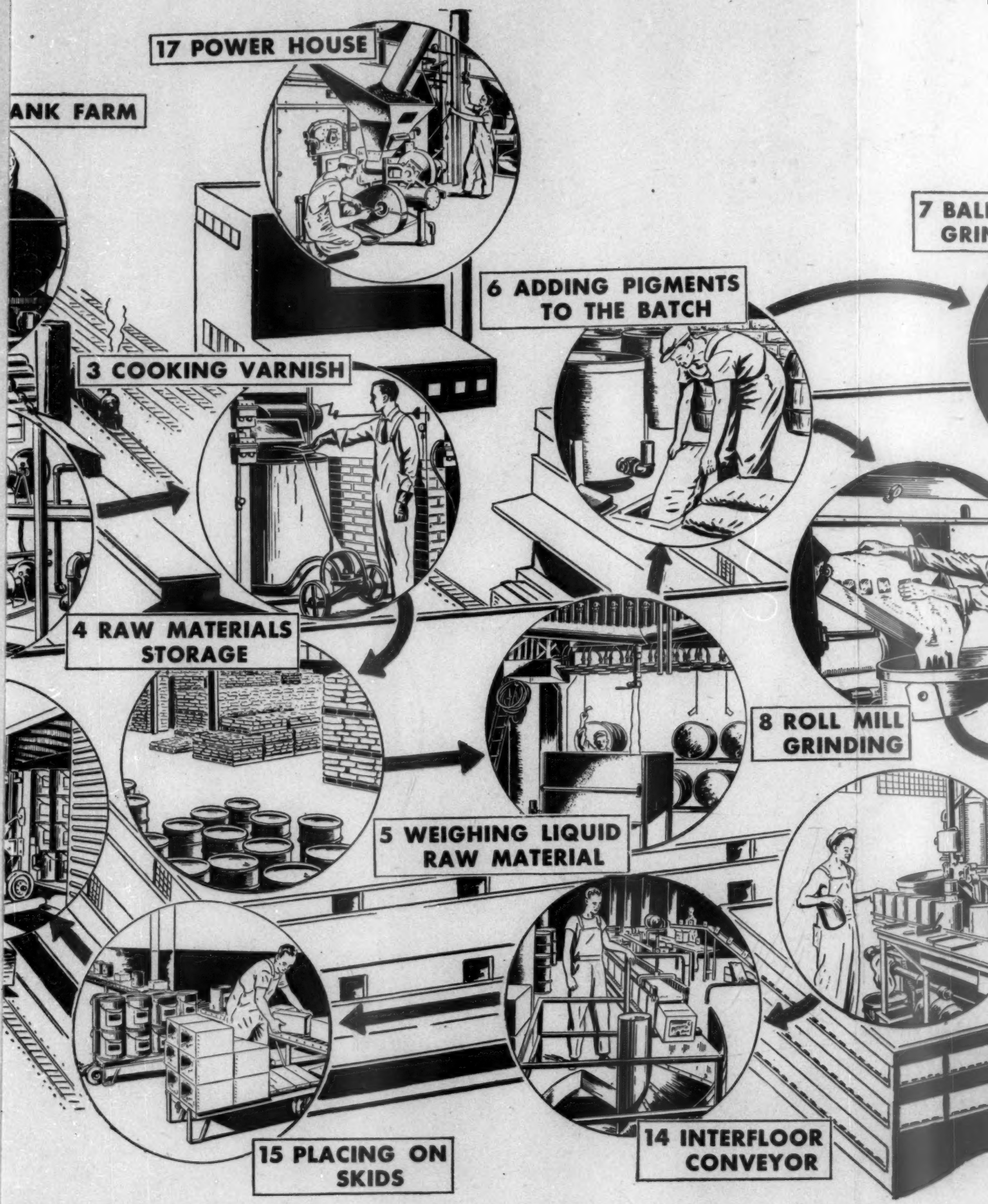
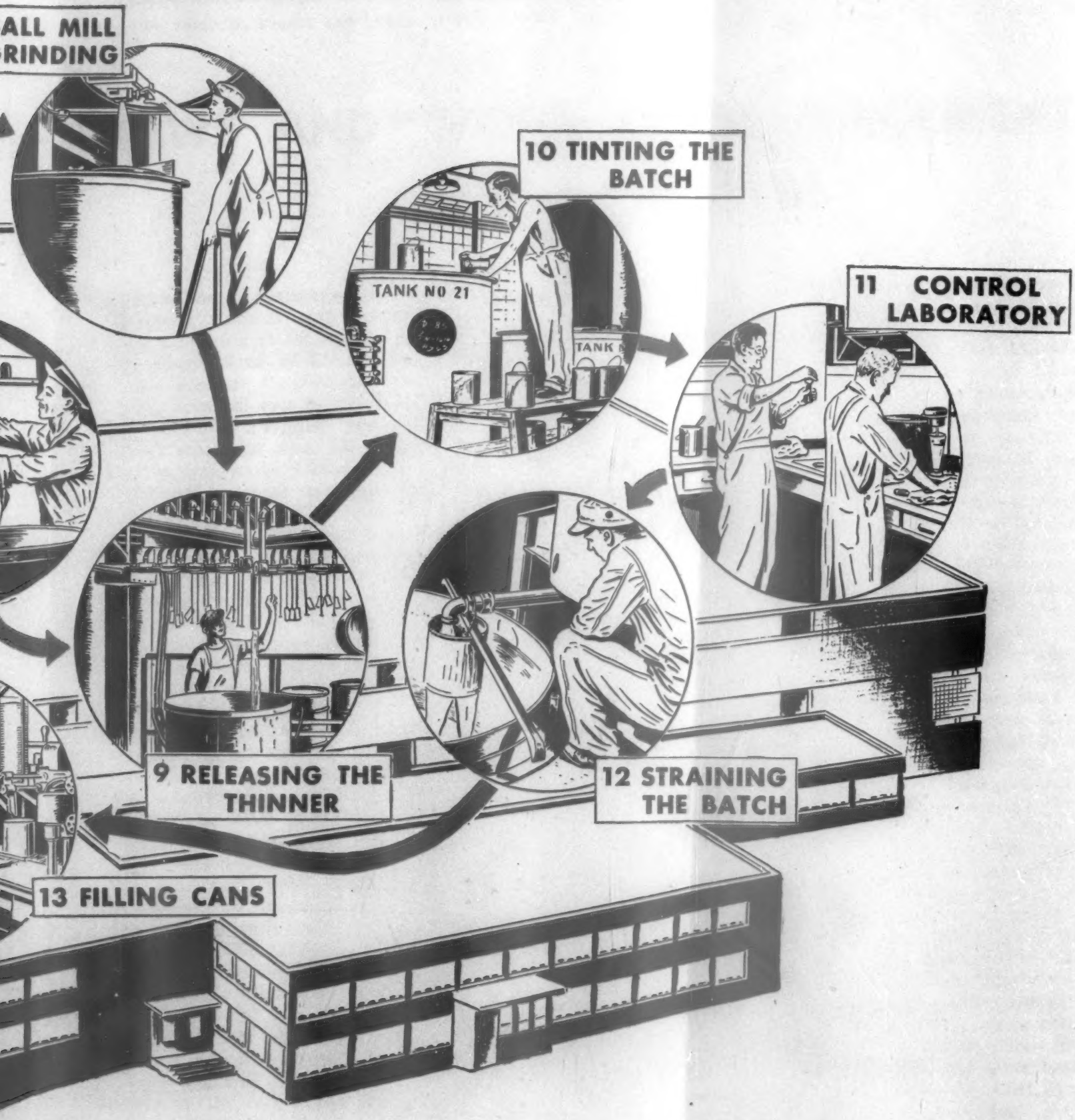

17 POWER HOUSE
ANK FARM
3 COOKING VARNISH
6 ADDING PIGMENTS TO THE BATCH
7 BALL GRIN
4 RAW MATERIALS STORAGE
8 ROLL MILL GRINDING
5 WEIGHING LIQUID RAW MATERIAL
15 PLACING ON SKIDS
14 INTERFLOOR CONVEYOR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LABORATORY
9 RELEASING THE
THINNER
12 STRAINING
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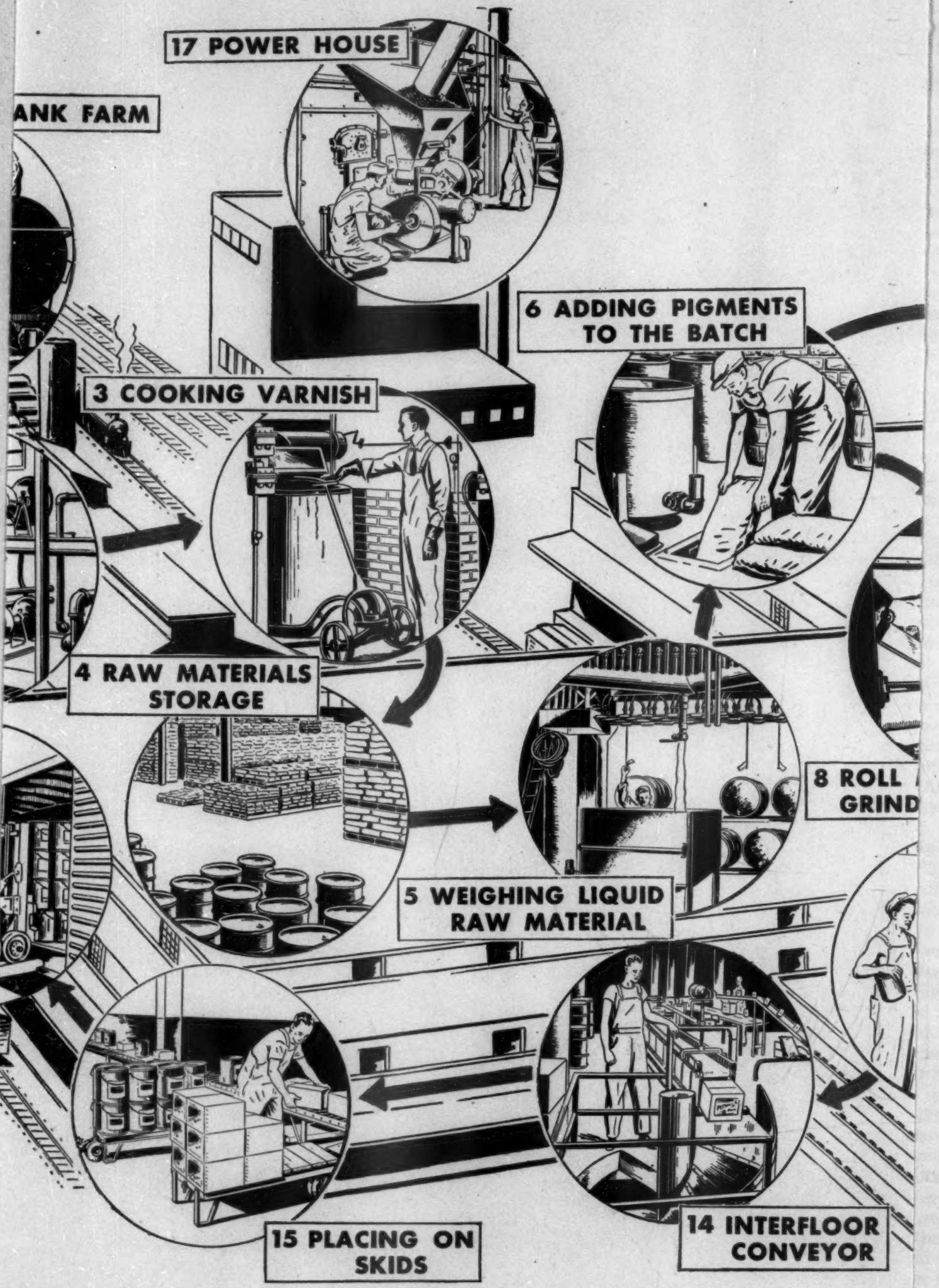
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CONVAIR EMPLOYEES LOUNGE AND LISTEN TO WEEKLY PLANT NEWSCAST TUESDAY MORNINGS DURING REGULAR 10-MIN. REST PERIOD

NEWS AND "VOICE OF MANAGEMENT" ON P. A. SYSTEM

BETTER lines of communication between workers and management are being established at the San Diego plant of Consolidated Vultee Aircraft Corporation. One of the principal aids in this broad effort has been a regular "company news" broadcast over the public address system every Tuesday.

Then, on alternate Thursdays, the "voice of management" is heard. The division manager talks man-to-man with the more than 10,000 employees scattered over the vast plant.

During the first 10-min. rest period on Tuesdays, the newscast gives facts concerning new orders, or cancellations; announcements of new training courses; and other news relating to the worker and his fellow-workers, the job, and the company. No persuasion, no advertising, just straight news is heard. Unless the plug for plant safety, which always ends the program, could be considered an exception.

One of the most important jobs of the newscast is smashing rumors. Typical was a grapevine whisper following a brief incomplete news dispatch concerning a crash during a test flight of a plane built at the San Diego plant. Workers saw the possibility of a production shutdown until whatever design change might be indicated was completed. Production slumped at once.

Meantime, the Convair newsroom was working fast. Staffers collected the facts. By the next morning, it was possible to tell workers the real story: There was nothing wrong with the plane. In fact, it had come through with flying colors in view of the punishment it had taken. Because they had come to have confidence in the routine broadcasts, workers accepted the report without hesitation.

The "voice of management" is not confused in employees' minds with that of the regular Convair reporter. Except to introduce him, the newscaster is silent when Division Manager Frank A. Learman is on the air, every other Thursday, a different day from that of the newscast. Learman may praise, criticize, pound out some economic truths, or say whatever is on his mind. Checks with foremen at regular meetings and conversations with the employees at every possible opportunity—right out in the plant—indicate that these talks are generally accorded a good reception.

Certain mechanical considerations have been found to be important in connection with this "plant broadcast" method of communication. To protect the acceptance attitude, the plant loudspeaker system is rarely used for anything but the broadcasts. The broadcasts themselves must not only be factual, but also interesting. The voice must be audible. The many different ceiling and wall surfaces in a factory pose an acoustical problem which is best met by a slower voice cadence than in most broadcasting. (Spotters in different working areas check on reception.) The night shift gets the same broadcast as the day shift, by means of a recording.

DIVISION MANAGER (right) broadcasts biweekly to inform work force on current company problems

TYPE AND SIZE OF INDUSTRY	RATIO OF SANITATION PERSONNEL TO TOTAL PERSONNEL			SANITATION WORKERS PER SUPERVISOR		FIRMS IN WHICH PRODUCTION EMPLOYEES DO SOME CLEANING, PER CENT	ADMINISTRATION OF SANITATION				
	MEDIAN NUMBER OF PERSONNEL	RANGE OF SANITATION PERSONNEL, PER CENT	MEDIAN PER CENT OF SANITATION PERSONNEL	NUMERICAL RANGE WORKERS TO SUPERVISORS	MEDIAN NUMBER WORKERS TO SUPERVISORS		SEPARATE SERVICE DEPARTMENT ONLY, PER CENT	PART OF PRODUCTION WITH SANITATION SUPERVISOR ONLY, PER CENT	PART OF PRODUCTION WITH GENERAL SUPERVISION ONLY, PER CENT	PART OF MAINTENANCE ONLY, PER CENT	
ALL MANUFACTURING	700	0.5–9.3	2.4	1–35	15	62.0	40.0	2.5	22.0	11.0	
LARGE	2100	0.5–3.6	2.0	2–35	20	60.0	52.0	0.0	8.0	12.0	
SMALL	250	0.9–9.3	2.7	1–21	8	64.0	26.0	5.0	39.0	9.0	
ALL FOOD	500	0.0–10.9	4.0	1–40	12	84.0	29.0	16.0	26.0	0.0	
LARGE	1250	0.0–10.6	2.6	10–40	20	88.0	25.0	25.0	25.0	0.0	
SMALL	160	2.1–10.9	5.4	1–15	7	80.0	34.0	6.0	26.0	0.0	

ADMINISTRATIVE AND OPERATIONAL PROCEDURES, AS THEY AFFECT INDUSTRIAL SANITATION PRACTICES, HAVE BEEN ANALYZED. (RESULTS

SANITATION PRACTICES

ABOUT 3 per cent of the total personnel in industrial plants is engaged in sanitation work. More often than not, the plant cleaning job is handled by a separate service department.

These facts are among those brought out in a survey of plant cleaning practices that was conducted recently by the Industrial Sanitation Research Department of Joseph E. Seagram & Sons, Inc., Louisville, Kentucky.

A total of 82 organizations gave information regarding their cleaning practices. The respondent companies may be classified as follows:

1. Manufacturing Industries

a. Drugs, cosmetics, and toilet articles
b. Wood, pulp, paper products
c. General chemical—including paints, heavy chemicals, janitors' supplies
d. Machinery and equipment

2. Food Industries

a. Grain processing and bakery products
b. Canning and food preservation
c. Dairy products and beverages
d. General foods—sugar, oils, salt, desserts, and candy

Firms in the manufacturing and food industries that cooperated in the survey range in size from 120 to 20,000 employees. Those in the manufacturing industries employ more workers than those in the food industries. To tabulate the returns it was necessary to distinguish between the large and the small firms, in both industries. This was done by establishing the median number of employees in each of the companies responding.

It was found that the manufacturing industries that cooperated in the survey employ a median of 700 workers, whereas those in the food industries employ a median of 500. Therefore, organizations that employ more than the median number of their group are classified as large. Those having fewer than the median of their group are classified as small.

Data obtained from the survey are given in the accompanying table. Answers to the questions on which the survey was based lead to the following conclusions:

1. Ratio of Sanitation Personnel to Total Number of Employees

The percentage of total personnel engaged in sanitation work varies from 0.0 to 10.9 per cent. The first figure presumably means that other classifications of employees do all the sanitation work. Returns indicate that a median of about 3 per cent of total personnel of each of the 82 plants reporting is engaged in sanitation work.

SCHEDULING OF EACH CLEANER'S WORK						TRAINING PROGRAM FOR SANITATION PERSONNEL						
TWO OR MORE METHODS PER CENT	LABOR POOL ONLY PER CENT	BY AREA PER CENT	BY SPECIFIC ITEMS OR SURFACES, PER CENT	BY DAY-TO-DAY INSTRUCTION BY FOREMAN, PER CENT	BY TWO OR MORE METHODS, PER CENT	FIRMS USING RATING SYSTEM, PER CENT	FIRMS USING PURCHASE SPECIFICATIONS, PER CENT	FIRMS USING STANDARD CLEANING METHODS, PER CENT	FIRMS USING FORMAL CLASS LECTURES, PER CENT	FIRMS USING ON-THE-JOB INSTRUCTION, PER CENT	FIRMS USING INSTRUCTION MANUAL, PER CENT	FIRMS USING VISUAL AIDS, PER CENT	FIRMS USING TWO OR MORE METHODS, PER CENT
22.0	2.5	48.0	4.0	16.0	32.0	16.0	48.0	64.0	4.5	100.0	12.0	2.0	15.5
24.0	4.0	36.0	8.0	20.0	36.0	20.0	60.0	80.0	4.5	100.0	9.0	4.5	13.5
21.0	0.0	62.0	0.0	12.0	26.0	12.0	36.0	48.0	4.5	100.0	12.5	0.0	17.0
29.0	0.0	32.0	23.0	7.0	38.0	16.0	56.0	63.0	10.0	100.0	13.0	10.0	29.0
25.0	0.0	33.0	13.0	7.0	47.0	25.0	75.0	57.0	6.5	100.0	25.0	20.0	46.5
34.0	0.0	31.0	31.0	7.0	31.0	7.0	37.0	69.0	12.5	100.0	0.0	0.0	12.5

ABOVE IN CHART FORM) BY THE RESEARCH DEPARTMENT OF JOSEPH E. SEAGRAM & SONS ON THE BASIS OF A SURVEY OF 82 COMPANIES

IN 82 INDUSTRIAL PLANTS

2. Number of Sanitation Workers per Supervisor

The number of such workers per supervisor increases in direct ratio to the total plant personnel until a median of 1200 employees is reached. At that point 20 sanitation workers per supervisor becomes constant.

3. Cleaning Done by Production Employees

In the manufacturing industries 62 per cent of the firms reporting assign some cleaning to production employees. A still larger number of food plants, 84 per cent, follow this practice. These figures do not, however, indicate the amount of cleaning that is done by production employees.

4. Administration of Sanitation Work

Sanitation work is most often handled by a separate service department. Two or more methods are employed by 22 per cent of the manufacturing and 29 per cent of the food plants reporting. Most of these firms indicated some use of a separate service department.

5. Scheduling of Sanitation Work

Scheduling of such work by area is preferred over other systems. However, two or more methods are used by 32 per cent of the manufacturing and 38 per cent of the food firms covered in the survey.

6. Use of a Rating System

Rating systems are not widely used to determine sanitation levels. Only 16 per cent of the plants reported the use of rating methods. No attempt was made to determine the type or degree of rating.

7. Use of Specifications for the Purchase of Sanitation Supplies and Equipment

Specifications for the purchase of sanitation materials are used considerably more widely by the larger than by the smaller firms, in each group. No attempt was made to indicate the degree to which this means of control has been developed.

8. Use of Standard Methods of Cleaning

Standard cleaning methods are in wide favor. They are reported in use by 64 per cent of plants in the manufacturing industries and by 63 per cent of food industry plants.

9. Training Programs for Sanitation Personnel

On-the-job instruction is by far the most generally used method for training sanitation workers. Of the firms reporting all employ this method. Two or more methods are utilized by 22 per cent of firms.

DISTRICT MAP has nail at each intersection. Catgut is threaded over delivery route. Rectangular scale, upper left, is marked in time units. Gut is compared with scale to find time needed to make a delivery

TIME STANDARDS—EVEN FOR

As evidence of the unlimited use to which the philosophy of time and methods study may be put, FACTORY relates this experience of a British printing firm with its messenger boys

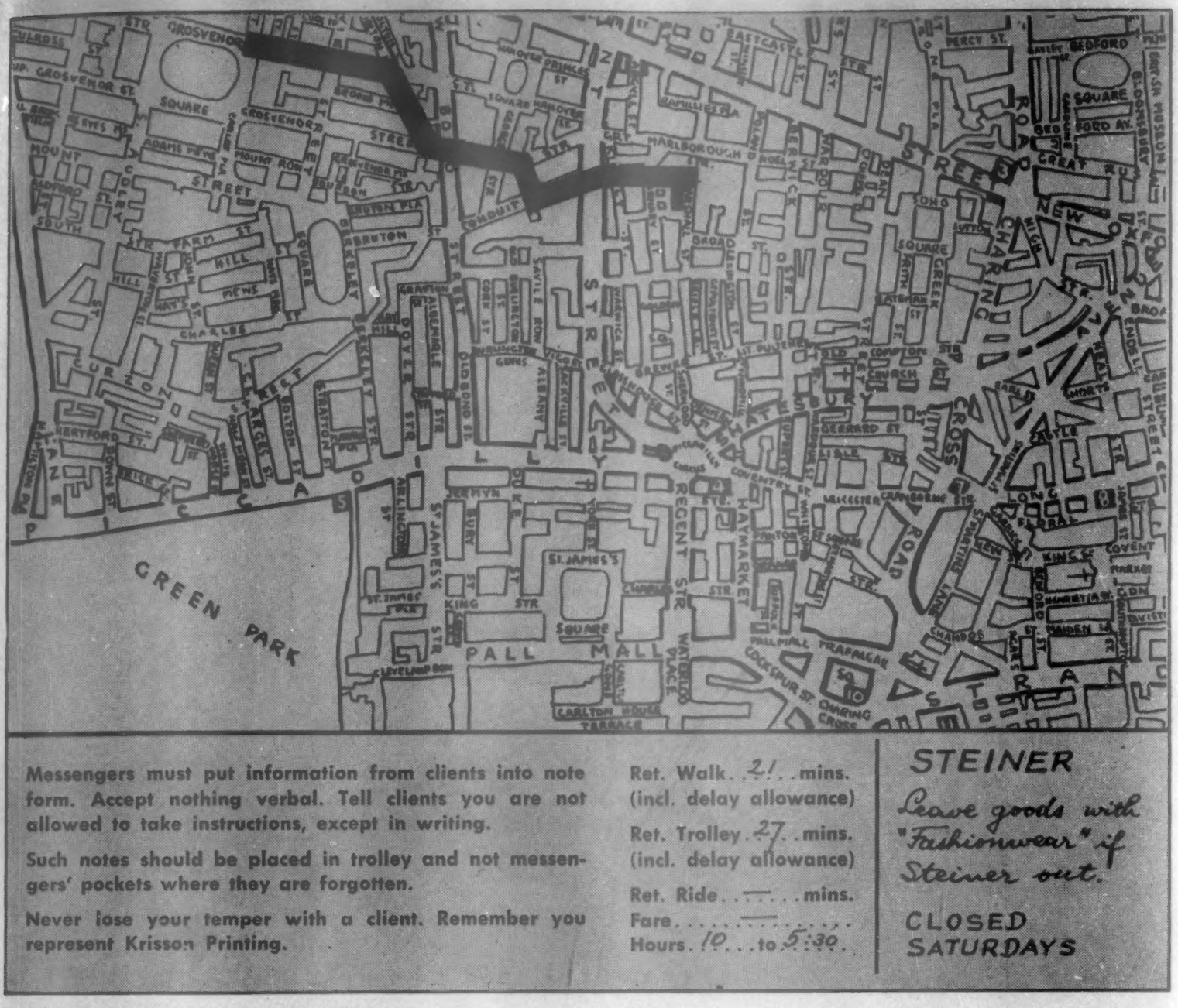
FREDERICK W. REILLY • WORKS MANAGER, KRISSON PRINTING, LTD. LONDON, ENGLAND

WE HAVE no dead-end jobs in our firm and, whenever possible, we promote from within. Consequently, we look upon every messenger boy as a potentially valuable employee. Our messengers deliver parcels by foot and by trolley (a two-wheeled, hand-propelled truck) to more than a thousand clients in the greater London area. When we tried to determine how soon we could switch a bright messenger to indoor work, we had a shock.

With all the brightness in the world, there are few lads who will deliver parcels at a consistent pace during the period of unsupervised outdoor work. Inevitably, there were customary visits to snack bars and rambling explanations of the difficulties encountered in finding "the place."

At the outset, we had four lads on full-time delivery. Upon investigation, it appeared that one and a half boys were sufficient. The other two and a half now take turns on indoor training. During the week a lad is on deliveries, he can earn an extra $2.

There were all-round gains. The delivery system is now so well organized and disciplined that the


GREEN PARK
PALL MALL
REGENT STR
HAYMARKET
CHARING CROSS ROAD
Messengers must put information from clients into note form. Accept nothing verbal. Tell clients you are not allowed to take instructions, except in writing.
Such notes should be placed in trolley and not messengers' pockets where they are forgotten.
Never lose your temper with a client. Remember you represent Krisson Printing.
Ret. Walk. 21. mins. (incl. delay allowance)
Ret. Trolley 27. mins. (incl. delay allowance)
Ret. Ride — mins.
Fare —
Hours. 10. to 5:30.
STEINER
Leave goods with "Fashionwear" if Steiner out.
CLOSED SATURDAYS

CUSTOMER MAP shows client's location and preferred route for messenger. Marginal information gives time allowed for walking with and without a trolley. Boy uses map as guide during delivery

MESSENGER SERVICE

lads learn to hustle the moment they enter the firm.

Initially, we took the four lads on Saturday morning walks about London to demonstrate a reasonable walking pace, with and without a trolley.

We then called on a hundred customers and timed with a stopwatch the period required for actual delivery of a parcel to a customer. The average time was 3 minutes.

In addition, we scaled the district and produced a map. Every street corner is marked with a nail. With a piece of catgut hanging from our location, we can plan a circuitous route for several deliveries. The catgut is threaded around the nails over the precise route to be followed.

A scale on the map, marked in units of 3 minutes' walking time, is used to measure the catgut required for the route, and the result is a direct reduction to minutes. Three minutes are allowed per delivery stop.

For one-stop deliveries, the map has been contoured in time zones from our plant, and a direct time reading is possible. We are also extending our findings to include an 8-mile area of our underground railways.

Further to decrease time lost when new messengers are sent to clients, 1000 maps were printed up in card form; one for each customer. On each map we showed the preferred and quickest route. Messengers were encouraged to collect material for marginal entries on these cards, some of which concerned the customer's whims about wiping feet on the map, or keeping a ferocious dog, or being shut on Saturdays, and so on. These entries are important for their effectiveness in speeding deliveries.

We have little doubt that the combined features of the weekly bonus and a carefully developed delivery scheme have given us substantial savings. Such savings can be made by any firm willing to investigate and act as we did.

TANK MOVING is still not child's play, but with fork trucks on either side, two skillful operators can do in a relatively short time a job that formerly required much cumbersome tackle and arduous labor of several men

IMPROVED HANDLING REPAYS

E. F. RITER • SUPERVISOR OF PRODUCTION CONTROL DEPARTMENT
THE GLIDDEN COMPANY, CLEVELAND

A WELL-ENGINEERED handling job often returns first cost within a matter of mere months.

For instance, while this report on a recent Glidden installation was being prepared for FACTORY—just nine months after completion of the project—results from six plants indicated a saving amounting to 89 per cent of the original investment. Which means, at that rate, the new handling equipment came within the proverbial ace of paying for itself after the first ten months of operation.

The percentages of savings for the plants that have used the new equipment long enough to compile significant records are: Plant A, 113 per cent in 20 months; plant B, 112 per cent in 8 months; plant C, 176 per cent in 8 months; plant D, 109 per cent in 8 months; plant E,

BARRELS arriving by boxcar are loaded four to a pallet and moved into the plant on hand fork trucks

KETTLES are moved by dropping C-hook over far rim, using forks to lift. Eliminates major accident hazard

RAW MATERIALS in bags are received on pallets, carried directly—and unhandled—to storage

89 PER CENT IN NINE MONTHS

37 per cent in 8 months; plant F, 24 per cent in 2 months.

In the percentages shown, the item of first cost actually has been placed too high. For example, some of the new equipment merely replaced older platform trucks which would have been replaced anyway. And the new pallets—which cost roughly a third less than the old skid platforms—also can be counted as replacements rather than a new investment. Had these factors been taken into consideration, the savings would, of course, have appeared even larger.

The equipment purchased was designed for a variety of purposes. Materials handling jobs that had to be performed included the handling of materials in barrels, bags, drums, and cartons. For these jobs lift trucks, pallet trucks, platform trucks, and motorized hand trucks were procured. They are being used alone or in combination, depending on the problems confronting each plant.

This equipment has made important savings in the normal processes of handling all materials—unloading, transporting, stacking, and loading. Not only does the new

Mechanized trucks of all kinds not only cut handling time, they also help in improving worker morale

LOADING is simple when barrels are cradled between forks of high-lift truck tipped up to discharge on van platform for delivery

UNLOADING is a cinch, too. Roll 'em off the tail gate on to a special cradle carried on the forks of a high-lift truck

equipment handle the material in far less time than formerly, but it has also brought about more efficient use of storage space. With new construction costing about $5 a square foot, this is an extremely important item.

In addition to these normal uses, the equipment has helped do a more efficient job in the plant engineering department. For example, when it was necessary to move mixing tanks within the confines of a plant from one location to another, as many as 40 hours of the time of relatively highly paid employees were required. Recently, however, such an operation was performed by using two fork lift trucks to move the tank. From the time it was disconnected in one department until it was set in position in another, the total time expenditure was 1½ hours. In addition, fork life truck operators are paid at a lower rate than mechanics.

Another job, which was formerly a hand operation was the removal of varnish kettles when they required "rebottoming." The removal, handling, and receiving operation alone formerly required as many as 25 man-hours for each kettle, when done with an elevator, winches, pulleys, and a crew of mechanics. Now, however, lift trucks raise the kettles from their carriages and place them on a truck which delivers them to the coppersmiths. On their return, the kettles are removed from the trucks by lift trucks and are placed back on the carriages. With one lift truck, its operator, and one mechanic to tighten the bolts, a kettle can be reseated today in less than one man-hour.

These incidental savings do not occur often enough to warrant the purchase of a truck for this purpose alone, but it is estimated that 10 per cent of the savings are made in such operations.

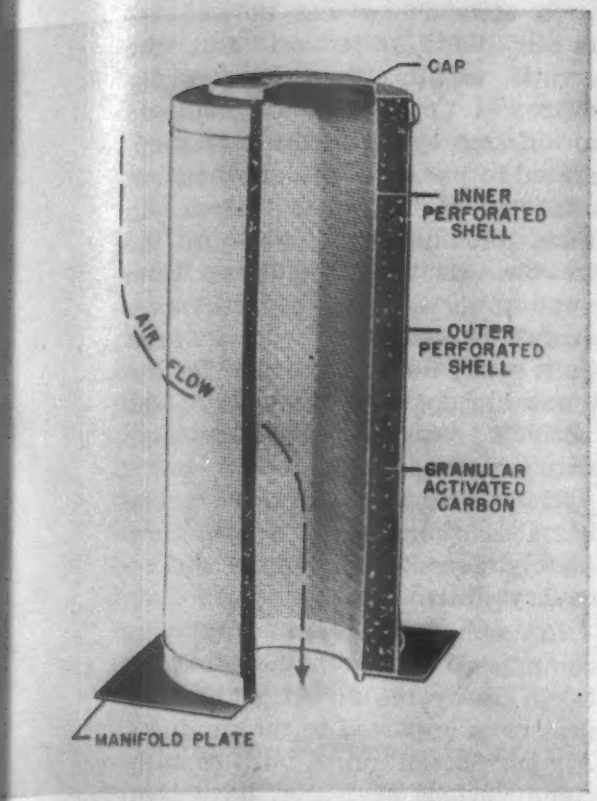
Intangible Advantages

Although they cannot be measured in terms of any specific units, mechanical equipment has made important contributions in the field of intangibles. For one, the power equipment has eliminated the old-fashioned "bull-gang" at most of the company's paint plants. Burden of heavy labor now falls on the machines rather than on the men. The morale of workers whose jobs formerly were nothing but drudgery has clearly improved.

Another intangible is safety. Glidden's accident rate has been greatly lowered. Especially noticeable is the reduction of strains resulting in hernias. Man-hours and hospitalization costs are saved, and morale is improved.

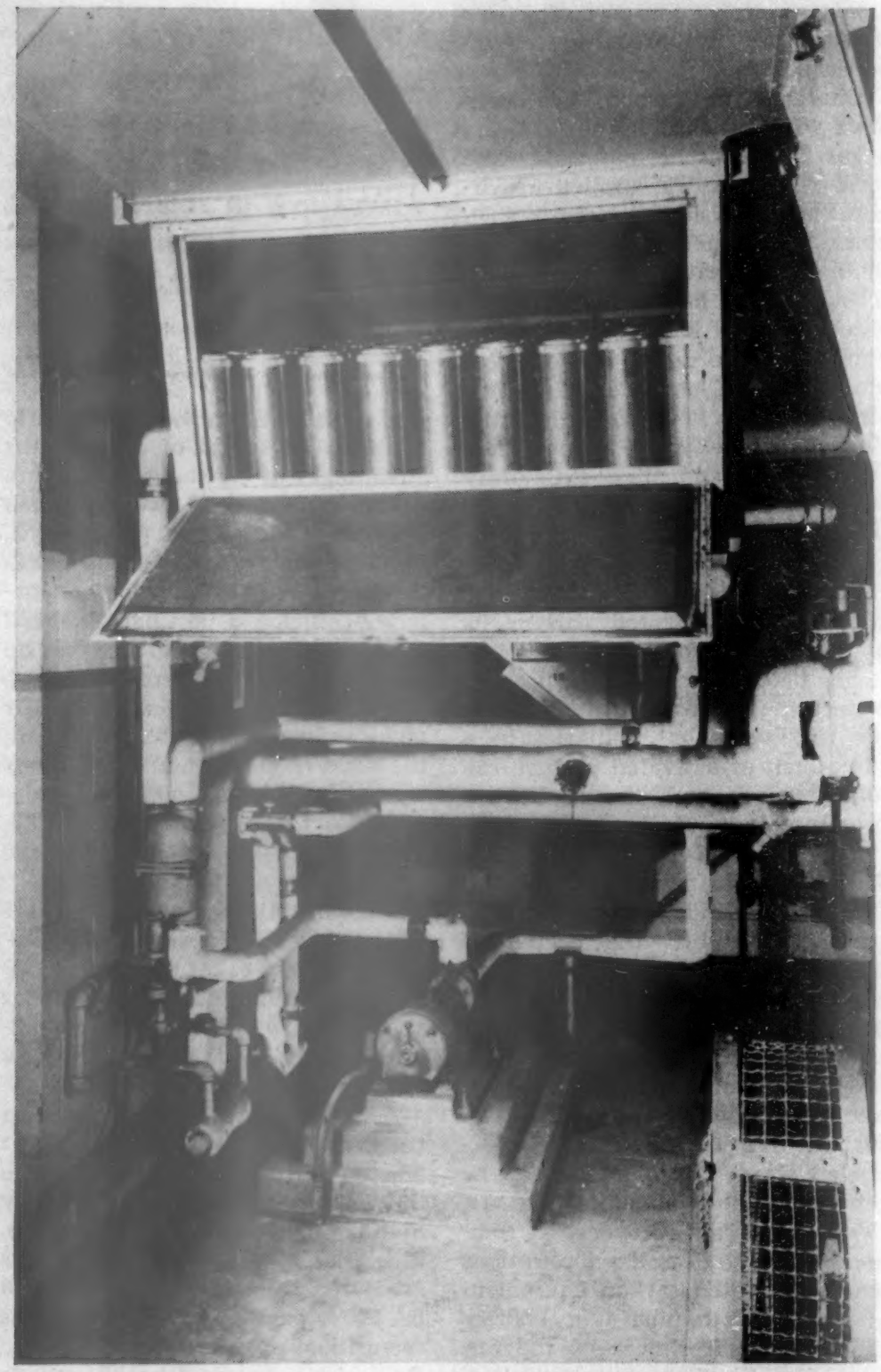
Another intangible, and another builder of morale, is the fact that much of the power equipment is being operated by old-timers, whose age would have cut their productivity by old-time standards. Many of these men have worked at manual jobs for many years. They are now accomplishing far heavier work than they ever did before—thanks to the new machinery.

To summarize, our new materials handling equipment is paying for itself at a rapid rate. In addition, it is proving invaluable as a builder of employee morale in the categories where it is needed most.



1. CANISTER. Cutaway view showing how canisters are constructed

2. CANISTER ASSEMBLY. Arrangement of canisters in a recovery unit



3. COMPLETE INSTALLATION. Seventy-two canisters purify 2160 c.f.m. Damper permits bypassing air between heating and cooling seasons

TAKING ODORS OUT OF AIR

G. A. VAN BRUNT • ASSOCIATE EDITOR, FACTORY

TAKING bad odors out of exhaust air solved a serious problem for a manufacturer of vitamins and hormones. Gases generated in the manufacturing processes were highly objectionable. Complaints were so strong and numerous that the management was forced to consider moving the plant to some other location, or discontinuing manufacture of profitable items. However, before either step was taken, a pilot air recovery plant was installed to determine whether this method of treatment offered any promise of relief.

This small installation worked so efficiently that a system capable of recovering 17,000 c.f.m. was put in. Now the air containing the ill-smelling gases is put through the recovery unit before it is discharged outdoors.

Removing odors, whether offensive or pleasant, from air is easier

than it might seem to be. It is necessary merely to pass the air through properly prepared activated carbon.

Charcoal, or carbon, has been used for centuries as a purifying agent for different materials. The term "activated" is applied to carbon that has been produced in such a way as to increase its ability to take up impurities. It is only in recent years, however, that activated carbon has been used to purify air in order to protect people, processes, or products. When airborne gases or vapors strike the surfaces of activated carbon they condense on and cling stubbornly to these surfaces, through an action known as adsorption.

The extremely large surface area, compared to the size of the particles, gives activated carbon its high efficiency for air purification. It has been estimated that if there were some means of flattening out the tiny voids or capillaries in a cubic inch of activated carbon, the total surface area would be approximately 5 acres.

The type of activated carbon used in air purification will, on the average, continue to adsorb gases and vapors until the condensed weight of the latter is approximately 20 per cent that of the carbon. When this point is reached the carbon is no longer efficient. Its properties can be restored, however, by reactivation, a simple process that involves treatment with superheated steam and one that can be repeated almost indefinitely.

The term "air recovery" is commonly used to describe applications where activated carbon equipment is employed to purify or recover the original freshness of the air. Basically, all air recovery applications can be divided into three broad types:

1. To reclaim the desired freshness of air that has been contaminated by external conditions before it is admitted to a room, building, or other enclosure.

2. To reclaim air freshness by eliminating contamination at or near the source.

3. To reclaim freshness of air that has become stale or contaminated within a room, building, or other enclosure. This is the most common, and by far the widest, application of air recovery.

There are many instances where pure air is essential in the manufacture and storage of products.

Every Month . . .

AMONG THE ADVERTISING PAGES, these valuable aids to low-cost production: the plant operation man's guide to **WHAT'S NEW IN EQUIPMENT** (page 136) . . . a summary of **LABOR DEVELOPMENTS** (page 226) . . . things **YOU WANT TO KNOW** more about (page 216)

Although sometimes difficult to evaluate in terms of money, the advantages of air that is free from contamination are worth much more than the cost of purifying it. For example, the bread and cakes made in a large bakery were somehow acquiring a peculiar chemical flavor. At other times there was an unmistakable taste of kerosene. Since the bakery was situated near an oil refinery and a chemical plant, the sources of the damaging odors were plain enough. Bakery products, particularly before cooling, will readily absorb odors from the surrounding air.

Stopping these unwanted odors before they could permeate the cooling bread and cakes was a relatively simple matter. The cooling floor was closed off so that all air admitted to it had to pass through an air recovery unit.

A midwest brewery is located in the heart of a city in which a great amount of coal is consumed. Hence the air contains a correspondingly high percentage of sulphur dioxide. This acid gas can affect the flavor of beer if it is allowed to enter the brewery, particularly if it reaches the critical process of wort cooling. By making certain that all outside air entering the wort cooling room is first purified by activated carbon, all danger of contamination is avoided.

Operators of overhead cranes serving some metal refining or other operations may be subjected to harmful or objectionable gases. The fact that the crane is mobile would make it difficult to supply fresh, uncontaminated air, even if the source of such air were available. However, by sealing the cab and drawing the ventilation air supply through activated carbon, such gases are effectively trapped.

Another example of harmful contamination of outside air came to light when a large manufacturer of photographic film experienced erratic sensitivity of the product, despite every precaution. Eventually a coincidence was noticed between wind direction and the erratic results. An air recovery unit was applied to the make-up air of one system, which was operated in parallel with another, but unprotected, identical system. In time, the ultimate cause of the trouble was traced to fumes from a phosphorus plant several miles away. These fumes were so faint they could not be detected by humans although an analysis of the activated carbon revealed their nature immediately.

The air that enters the processing area of the plant is now completely decontaminated by air recovery units.

In some processes employing compressed air, even the oil vapor taken up by the air from the compressor is imparted to the products. Air purification units, built to withstand various pressures, have been developed to filter out any odors before they can cause damage. Such precautions have been found to be valuable in cosmetic manufacture and, in fact, wherever pneumatic agitation is employed.

Exhaust Purification

An example of the second type of application, involving purification of exhaust air, was cited at the beginning of this article. It is typical of a number of such installations, particularly where nuisance abatement is essential.

They include sewage disposal plants, rendering plants, plant cafeterias, and restaurant kitchens, which depend upon air purification to avoid complaints.

Purification of Recirculated Air

The air conditioning system serving the assembly department of a precision instrument plant has a total air circulating capacity of 45,000 c.f.m. This system was designed to provide a minimum of 25 per cent outdoor air for ventilation purposes, with provisions to increase the supply to 100 per cent outdoor air during periods when no conditioning is necessary. Hence, the capacity is adequate for only 25 per cent outdoor air supply when unfavorable summer or winter outside temperatures prevail.

The system functioned satisfactorily until an unforeseen expansion in production, coupled with the introduction of processes that released petroleum derivative fumes, demanded increased ventilation. Adequate air capacity was

available, but conditioning capacity was lacking. The problem was acute mainly during the heating and cooling seasons, when an increase in outdoor air would mean a sacrifice in quality of air conditioning that could not be tolerated.

To solve the problem by increasing the cooling and heating plants would have required a considerable expenditure. As an alternative, provisions were made to recover the air recirculated within the plant. Besides supplying, in effect, the additional ventilation needed, it was found that the amount of outdoor air required by the original installation could be reduced. Thus, not only was the purchase of additional equipment avoided, but also a saving was effected in the fuel, power, and water consumption of the existing system.

For the Perfume Maker

Accurate testing or checking of the fragrance of essential oils is important in the perfume industry. So far the sense of smell is the only satisfactory method. Laboratory technicians often find, however, that where a number of different scents are sampled their odors linger in the atmosphere, making true evaluation extremely difficult. Moreover, it is seldom possible to locate a spot in an essential oil laboratory that is odor-free.

A small booth equipped with an air recovery unit provided the answer, in one laboratory. All the air in the booth is completely purified every three minutes, which means that the chemist has a space that is free of distracting scents in which to sample essences.

Various industries maintain animal laboratories for biological research work. Odors around these laboratories are pungent and typical of those found in zoos. In a completely air conditioned laboratory in a midwest city, 13,000 c.f.m. of air is purified and returned to the space, instead of being vented or circulated throughout the plant.

After 18 months of operation, when reactivation of the carbon became necessary, it was found that 150 pounds of noxious gases had been adsorbed and retained.

Comfort air conditioning, including both heating and cooling systems, particularly when there are large numbers of people in confined spaces, offers by far the greatest potential use for air recovery.

The greater the occupancy of any air conditioned space and the higher the generation of odors, the greater will be the demand for ventilation, or fresh, odor-free air. Throwing open doors and windows obviously is a simple and quick way to ventilate any enclosure. When indoor and outdoor temperatures are approximately equal, good ventilation is no problem. But during the winter and summer it is not possible to open doors and windows without exceeding the capacity of the system. Any air that enters the structure must replace or force out an equivalent volume of indoor air. And when indoor air which is thus replaced has been conditioned, money has been spent to heat or cool it, and that money is irretrievably lost.

The percentage of new air to be conditioned therefore determines to a large extent the capacity and consequently the equipment investment and operating costs. When contaminated and odorous air is recovered it is already at the right temperature and humidity. As the volume of air to be conditioned is reduced, the capacity of the air conditioning system and its operating cost likewise can be reduced.

It has been estimated that under temperate zone conditions, the difference in cost between conditioning 1000 c.f.m. outdoor air and recovering a like volume of indoor air is about $170 annually, allowing for interest on and amortization of the investment.

Air recovery is not, of course, a substitute for air conditioning. The equipment cannot be used to remove dust or other comparatively large particles from air. Nor does it change the temperature or humidity in any way. The sole purpose and effect of air recovery is to remove odors, which is done by condensing the gases or fumes that produce the odors. In performing this function, however, air recovery may appreciably lighten the burden on an air conditioning system.

Design and Application

The equipment for air recovery is simple. A single unit consists of a canister that contains the activated carbon filter medium. As shown in Figure 1, the canister consists of an inner and outer perforated shell, the space between being filled with the granular activated carbon. It is closed at the top, but has a circular central opening at the bottom that fits into a hole in the supporting manifold plate.

Canisters are 10½ inches high and vary from 3¾ to 4⅜ inches in width, depending on the thickness of the carbon bed.

Spacing of the canisters on each manifold plate is uniform in both directions, Figure 2, to insure uniform air flow through the entire exposed area of each canister.

The required number of canisters per manifold plate may be arranged in whatever number of rows will best accommodate the available space. For example, 60 canisters may be arranged in three rows of 20 each, four rows of 15 each, five rows of 12 each, and so on.

The recommended air capacity of each canister depends upon the nature of the service, the character of the air-entrained impurities, and their concentration. In general practice it will vary from 20 to 35 c.f.m. Resistance to air flow in this range will be from 0.15 to 0.25 inch water gage.

Remove Dust First

Recovery units must always be preceded by dry-type dust filters in order to prevent clogging of the carbon.

When used to reclaim the freshness of recirculated air, the recovery units are located in the return air duct of the system, as in Figure 3, or in the plenum chamber in which the return and outside air are mixed before being supplied to the conditioned zone. The size of the installation depends, of course, on the volume of recirculated air to be purified.

Suppose, for example, that it is desired to decontaminate 10,000 cubic feet of air per minute. Assuming a capacity of 25 c.f.m. per canister, 400 canisters would be required. If they are arranged in rows ten deep by ten wide and four tiers high, the installation would require an area approximately 4 feet wide, 4 feet deep, and 9 feet high.

In intake or exhaust applications a simple casing usually suffices. Where the canisters are exposed to acid gases, a corrosion-resistant coating is applied.

Where space is at a premium, as in public carriers and unit conditioners, for example, panel-type air recovery units are used. These units consist of carbon-filled, perforated metal tubes arranged in one, two, or three rows, with variable spacing between the tubes, depending upon the efficiency required. The tubes are mounted in metal frames, whose over-all dimensions are similar to those of standard dust filters.

CASES IN WORK SIMPLIFICATION

EVERYBODY pitches in at Micro Switch to find the best method of doing a given job.

Without fuss or flurry, office and factory employees alike cooperate for efficient operation.

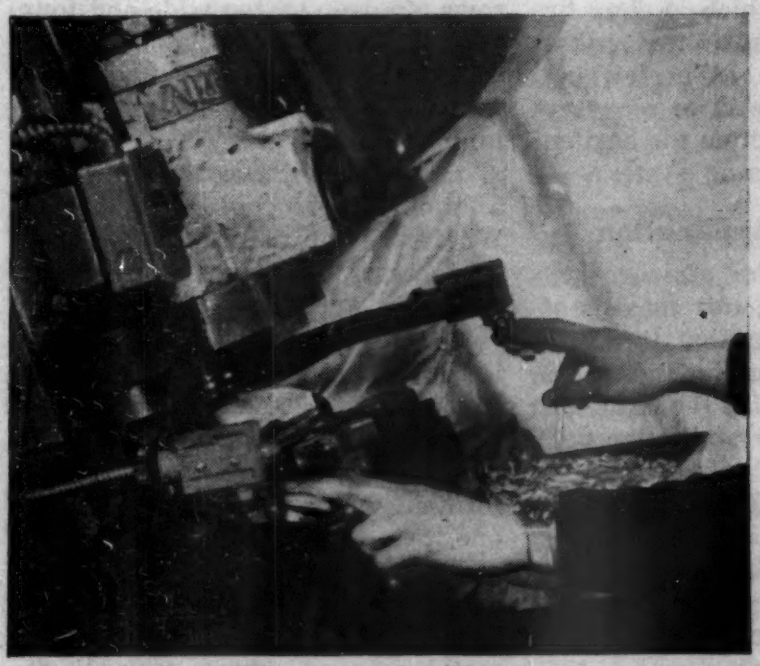
Micro Switch applies a rule-of-thumb measurement of suggestion value. The rule, "tooling or change-over cost required to evolve a new method should be returned during the first year of its use," has few exceptions. They include: Setting up new departments; purchase of standard equipment for general improvements in manufacturing methods; where worker fatigue will be essentially reduced; and where product quality will be improved.

Here then, are six typical cases from the notebook of P. R. Enzler, plant superintendent of Micro Switch Division, First Industrial Corporation, Freeport, Ill.

MAGNETIC ANCHOR holds transparent plastic guard to work surfaces on screw machines. Guard can be moved simply by lifting or sliding. It is adjustable to many positions on numerous machines.

Result. Operator can see work but is protected against oil spray and flying chips. The work place is cleaner. Safety goggles need not be worn.

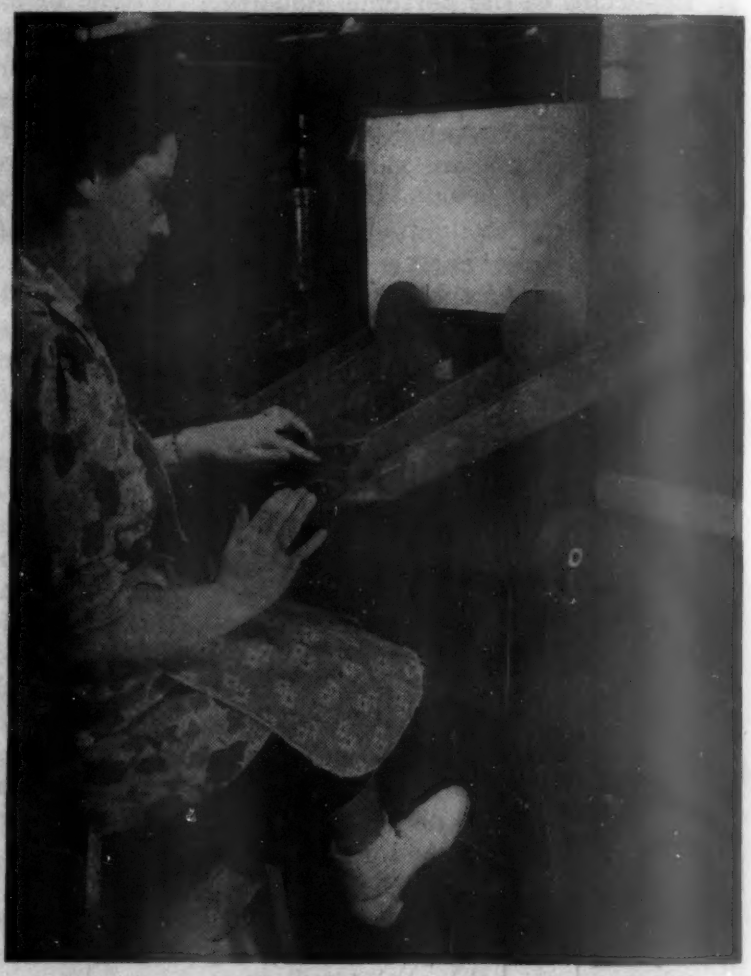
●



SAFETY CONTROL for punch press. Formerly, a two-hand trip requiring 13½-lb. pressure to actuate was used. Die accommodated one piece per cycle. Two quick-acting electrical switches, requiring 6½-lb. pressure, were installed. Die was changed to hold two pieces.

Result. Operator fatigue was reduced. Production rose from 1610 to 2500 pieces per hour.

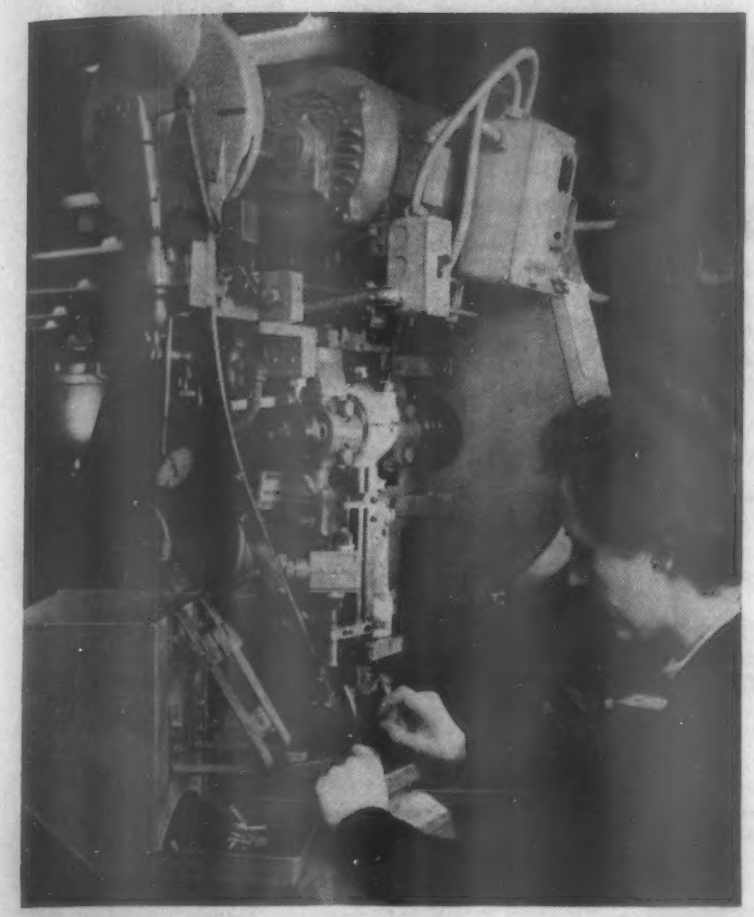
●



CLEANING MACHINE for switch covers. The old method was to place several hundred covers in a wire basket. An air stream was applied but never quite did the job. Now a home-made machine using air jets and revolving brushes engages all surfaces to remove dust, lint, and plastic chips. Covers flow from hopper, down gravity chutes, to feeding track leading into machine. They pass through the machine and are carried by automatic conveyor to the next operation.

Result. Quality is improved. Unnecessary handling is reduced. Flow is constant. Tote boxes, pans, and wire baskets were discarded.

8. Micro Switch Div., First Industrial Corp.



SUBASSEMBLY OPERATION of silver contacts to springs. Contacts are fed from hopper to press by slide. Operator places spring from bin (left) on contact in press, trips press with pedal, and repeats operation. It's as simple as that. Downward stroke of press does the riveting. Assembled parts are raised by two pins in die. Air blast blows them into trough.

Result. Output up from 450 to 1430 pieces per hour.

•

SWITCH LABELER for printing catalog data on both sides of cases. Two small printing presses have rubber rollers to transfer ink from platens to stamps which imprint the sides of cases. Cases are placed on racks and advanced by pushers to the gravity chute. At the bottom of chute, cases are fed to presses, pushed onto trays and dried. Ink is automatically applied to platens as they rise during impressions to touch needle valve on air cylinders suspended above them. Cases were formerly printed by hand.

Result. Production was increased from 865 to 2380 pieces per hour. Work is easier. Quality is improved.

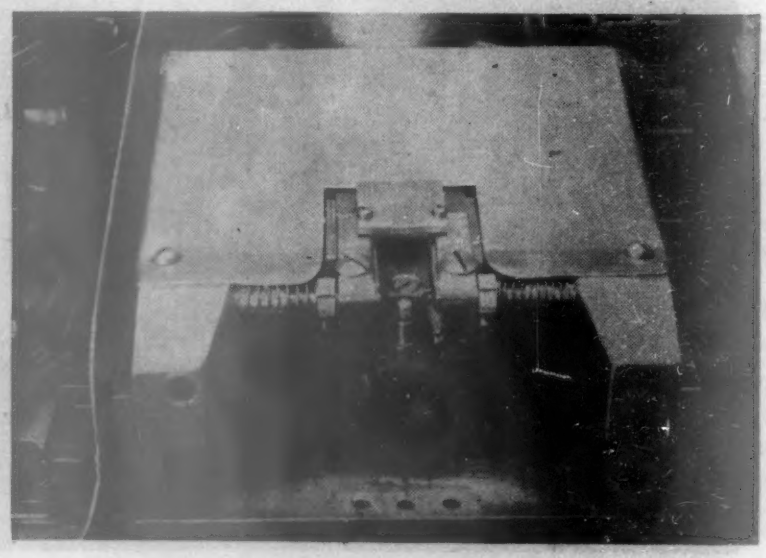
•

TWIN SCREWDRIVER for case assembly. Case screws were formerly driven separately by electric driver. A motor-driven, twin driver was built. Two driving bits are held in the up position by air. A spring lowers the drivers to the screw-heads when a foot lever interrupts the air supply. Switch cases are fed through the operation on slide rail conveyors.

Result. Production rose from 890 to 1785 units per hour. The job is easier.

AUTOMATIC GREASER for switch plunger. Switches are taken from the dual hopper-fed side troughs and placed into fixture. A foot pedal energizes a solenoid which forces grease through two copper tubes to the pin bosses on each side. The operator formerly applied the grease by hand with a knife.

Result. Production is up from 500 to 1450 pieces per hour. Quality is improved. Work is cleaner and easier.



Anna M. Rosenberg

urges management to offer

A NEW INDUSTRIAL CITIZENSHIP FOR AMERICA'S WORKERS

One of the country's leading women statesmen in the field of labor relations states her conviction that the American worker and the American employer can move forward together to new peaks of productivity and prosperity if they can learn to trust each other

■ When it became possible for Mrs. Anna M. Rosenberg to put aside her important wartime duties, she returned to her private practice—counsel on public and employee relations to some of the most important firms and individuals in the nation.

To this private work she has added service on the President's Advisory Commission on Universal Training, the Manpower Consulting Committee of the Munitions Board, and the Federal Advisory Council of the U. S. Employment Service.

Prior to the war, Mrs. Rosenberg was regional director of both the NRA and Social Security Board, as well as confidante and industrial relations adviser to President Roosevelt and Mayor LaGuardia.

Her war record includes service as regional director of the War Manpower Commission, and as personal representative of Presidents Roosevelt and Truman to the European Theater to report on problems of the returning soldiers.

Mrs. Rosenberg holds the Medal for Merit, and was the first civilian to receive from General Eisenhower the Medal of Freedom.

IF AMERICAN INDUSTRY put into employee relations 10 per cent of the energy and ingenuity it applies to developing and marketing its products, the stability of the free enterprise system would be secure against any challenge.

In plant after plant, forward-looking employers are finding that it pays to give men and women a sense of "belonging" in the plants in which they work. This does not mean paternalism in the old sense. It goes beyond wages and hours and all the other normal concomitants of collective bargaining.

All these factors are of the utmost importance to a stable working relationship. There can be no lasting peace in an industrial establishment unless management and labor approach their responsibilities on such economic matters in a spirit of mutuality and good will.

But what I am concerned with in this article is something that rests upon and yet is quite separate from these things. *It is the necessity for a new kind of industrial citizenship based on a worker's understanding of his own importance in the work of his plant and of his plant's importance in the total life of the community.* Jobs must be made worth while in terms that go beyond the weekly pay check. A worker who feels his work has real usefulness is more likely to be a productive and cooperative employee than one whose sole interest in his job is how much he can get for how little effort.

Our wartime experience made clear the extent to which social drives took precedence over economic advantage in the minds of millions of American workers. People flocked into plants manufacturing bombers, tanks, and other military equipment, even though in many cases it meant leaving posts in which they had seniority and equally good earnings. As one actively involved in the task of meeting industry's manpower requirements during the war years, I was repeatedly struck by the eagerness with which workers sought identification with the war effort at the cost of their own long-time security.

I do not think the cessation of hostilities has in any way diminished the fundamental desire of most people to be involved in a job they feel contributes directly to the general welfare. I recently visited a large manufacturing plant in up-state New York, at which I found support for this theory.

Job Tedious, Production Low

One department of the plant was engaged in a by-product operation that involved tedious, dirty work on the part of the employees. As a result, job satisfaction was low and turnover was high. Productivity was slipping toward the vanishing point until management undertook an educational campaign intended to let the employees know the significance of the job they were doing.

The workers were informed, both by the company and by eminent medical authorities, that the product was a potent aid in cancer research and that the plant represented virtually the sole source of supply. The effect was almost magical. As soon as the workers grasped the idea that they were pioneers in the fight against one of mankind's most dreaded enemies, they threw themselves into their work with an enthusiasm that soon erased all worries about the volume of output.

It is true that not all products lend themselves to such dramatization, but there are few industries that do not have a story that will quicken the imagination (and the hands) of their workers *if management will only take the trouble to tell it.* That is especially true of the basic industries in these days of world rehabilitation. The workers in steel and other heavy industries are truly "architects of the peace" in a much more fundamental sense than the world's diplomats.

Every Field Allows Pride in Job

Turning to a very dissimilar field of endeavor, one finds the same opportunities for building pride of job in a large department store. By emphasizing the store's role in bringing quality merchandise to consumers at lowest prices, the store management could tap the same social impulses that prompted its sales clerks to sign petitions calling for continuation of OPA. In the range between store and factory, there exist thousands of possibilities for awakening in workers the sense of social usefulness that is indispensable to full productivity.

Here is a fertile field for exercise of the great advertising talents that have built undreamed-of markets for our automobiles, refrigerators, vacuum cleaners, and radios. Instead of concentrating on the purchaser of the product, this involves "selling" the man who makes it. It is not a task that can be performed through the blanket application of identical techniques to all plants. It involves specialized approaches to workers in different plants and in different departments within a plant. No employee should be overlooked, no matter how prosaic his function.

How much satisfaction a worker gets out of his job depends also on how the plant is regarded in the community. Is its reputation such that he can boast of working there? Or must he apologize every time he mentions the plant? If the company is one his friends and associates respect, the worker's own pride in working there is measurably enhanced. This puts a continuing responsibility on management to take an active interest in civic affairs and to make known, through advertising and direct contact, the contribution it makes to the community's welfare through its payrolls, its products, and its extramural participation in philanthropic movements.

Many companies have found that "open house" days are extremely beneficial in this respect. Allowing workers to invite their families to inspect the plant and throwing the doors wide for public visits help get across a feeling of good neighborliness, plus an understanding of the techniques that are used in the plant and the working conditions that are main-

★ **A worker who feels his work has real usefulness is more likely to be a productive employee than one whose sole interest in his job is how much he can get for how little effort . . .**

★ **A partnership is not something you talk about; it is something you live . . .**

★ **How much satisfaction a worker gets out of his job depends on how the plant is regarded in the community . . .**

tained. A fresh coat of paint on the outside of the plant and a neatly clipped lawn often represent important investments in community good will and heightened employee morale.

Underlying all these steps to give the worker a sense of "belonging" is the need for making him a partner in the business in something more than a rhetorical sense. In too many plants the president will make a speech once a year or enclose a printed message with the Christmas bonus check, in which he emphasizes that the plant is one big partnership in whose success everyone has a share.

That is an excellent slogan, provided it is practiced every day in the year. A partnership is not something you talk about; it is something you live. If workers are to accept the notion that their well-being and the well-being of the business are inextricably interwoven, management will have to reconcile itself to some of the responsibilities that inevitably go with such a relationship.

The primary necessity is for a regular channel of communication, through which the employer makes available to all workers the fullest possible information about the status of the business. This means both profits and prospects presented in clear-cut, nonargumentative terms.

Most employers wait until they are in the middle of union negotiations before they think much about talking to their employees. This fire-brigade approach is far less effective than a sustained, year-round effort to keep workers informed about management's problems and viewpoint. The more factual the presentation is, the more likely it is to carry conviction.

Often business men grow discouraged because their first attempts to give their workers a realistic understanding of the company's ups and downs are greeted with disbelief. There should be nothing surprising in this. Suspicion toward management has been carefully cultivated for many years. Employers cannot hope to break it down overnight.

Most Americans react badly to special pleading. It is up to management to put forward a positive picture and to do it with such frankness that doubts about its motives will ultimately fall of their own weight. To those who are worried about how much they can safely tell their workers, I would say tell them everything that will help them understand how the business is going and what the outlook is for the future. Every time you tell your workers you can't give them a relevant bit of information, you undermine to that degree the concept that this is their business, as well as yours.

A systematic information program should not be adopted as a means of undercutting the status of the established union in a plant, but it does help safeguard management against demagogic demands and misrepresentation. There is nothing incompatible about such an information program and a cordial union relationship. On the contrary, with a responsible union in the plant, a program of this type will inevitably prove an agency for promoting cooperation in the achievement of common aims.

I feel industry has missed a bet in allowing to lapse the joint management-labor committees that flourished in thousands of plants during the war. Such committees have proved their worth in combating absenteeism, conducting in-plant training activities, eliminating waste, and carrying on such community drives as the annual Red Cross appeal. The existence of joint committees helps build up the sense of democratic participation that is so lacking among workers in large sections of industry.

The worker wants to feel that a two-way relationship exists in his plant—that his ideas, as well as his labor, are welcomed. Every encouragement should be offered to the expression by employees of their thoughts on how the plant can be operated more efficiently and how it can be made a pleasanter place in which to work. Joint committees can aid in their interchange of ideas.

I need hardly emphasize that the development of *esprit de corps* within an organization depends in large measure on the competence of the secondary leadership, represented in the plant by foremen and supervisors. Unless they fully understand and sympathize with the aims of top management, a cooperative program can never get off the ground.

Everything that I have said rests on a basic conviction that the American worker and the American employer can move forward to new peaks of productivity and prosperity if they can learn to trust one another. Workers want security, a rising standard of living, a chance to get ahead, and, above all, sense of personal worth and dignity. There is no conflict between these goals and the program of every decent business executive in this country.

All that is lacking is a common language. It is time industry did a little interpreting so management and labor could march forward together toward the ever-higher standard of living that is the goal of us all.

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★ A fresh coat of paint on the outside of the plant and a neatly clipped lawn often represent important investments in community good will and heightened employee morale . . .

★ There are thousands of possibilities for awakening in workers the sense of social usefulness that is indispensable to full productivity . . .

FIGURE 1. Pumped-tank mercury arc rectifier is rated 1500 kw., 250 volts, and supplies direct current for wire-drawing machines. At the left of the photograph a 13,800-volt, 12-phase rectifier transformer is shown

WHEN YOU HAVE TO CONVERT A. C. TO D. C. POWER

PART 2. In this article the characteristics, efficiencies, and some applications of mercury arc and three types of metallic rectifiers are discussed

E. W. HUTTON • CONTROL ENGINEERING DIVISION, GENERAL ELECTRIC COMPANY, SCHENECTADY

E. A. HARTY • LYNN RIVER WORKS, GENERAL ELECTRIC COMPANY, LYNN, MASS.

POOL-CATHODE electronic converters employ a pool of mercury as a cathode. An arc is established in the pool, and conduction takes place through the mercury vapor ionized in the arc. The mercury pool or cathode, its anode, and an ignitor that starts the arc, may be sealed into one unit known as an ignitron tube. In the larger sizes the enclosure may be evacuated with auxiliary vacuum pumps. Such a unit is known as a pumped-tank rectifier. In some cases there is a separate tank for each circuit; in others, several circuits are contained in one tank.

This type of rectifier is capable of supplying large currents at d.c. voltages of 250 to 3500 volts. Ignitron tube rectifiers are available in sizes of 25 kw. to 1000 kw., whereas tank units range from 500 kw. to 5000 kw. Efficiencies run from 90 per cent for the small units to 98 per cent for the large units, at full load.

Tube rectifiers require occasional tube replacement. First cost is comparable to that of a synchronous converter or motor-generator set, but the higher efficiencies, lack of moving parts, vibration, noise, or exposed contacts make this tye of rectifier highly desirable. Water cooling usually is employed, permitting total enclosure. Only light foundations are necessary.

Excellent regulation may be obtained by phase control, as with the vapor-filled, hot-cathode tube. The point of ignition is varied with respect to time in each cycle, to give the desired average d.c. output. Figure 1 shows an installation of pumped-tank mercury-arc rectifiers.

Metallic rectifiers usually are employed where small to high cur-

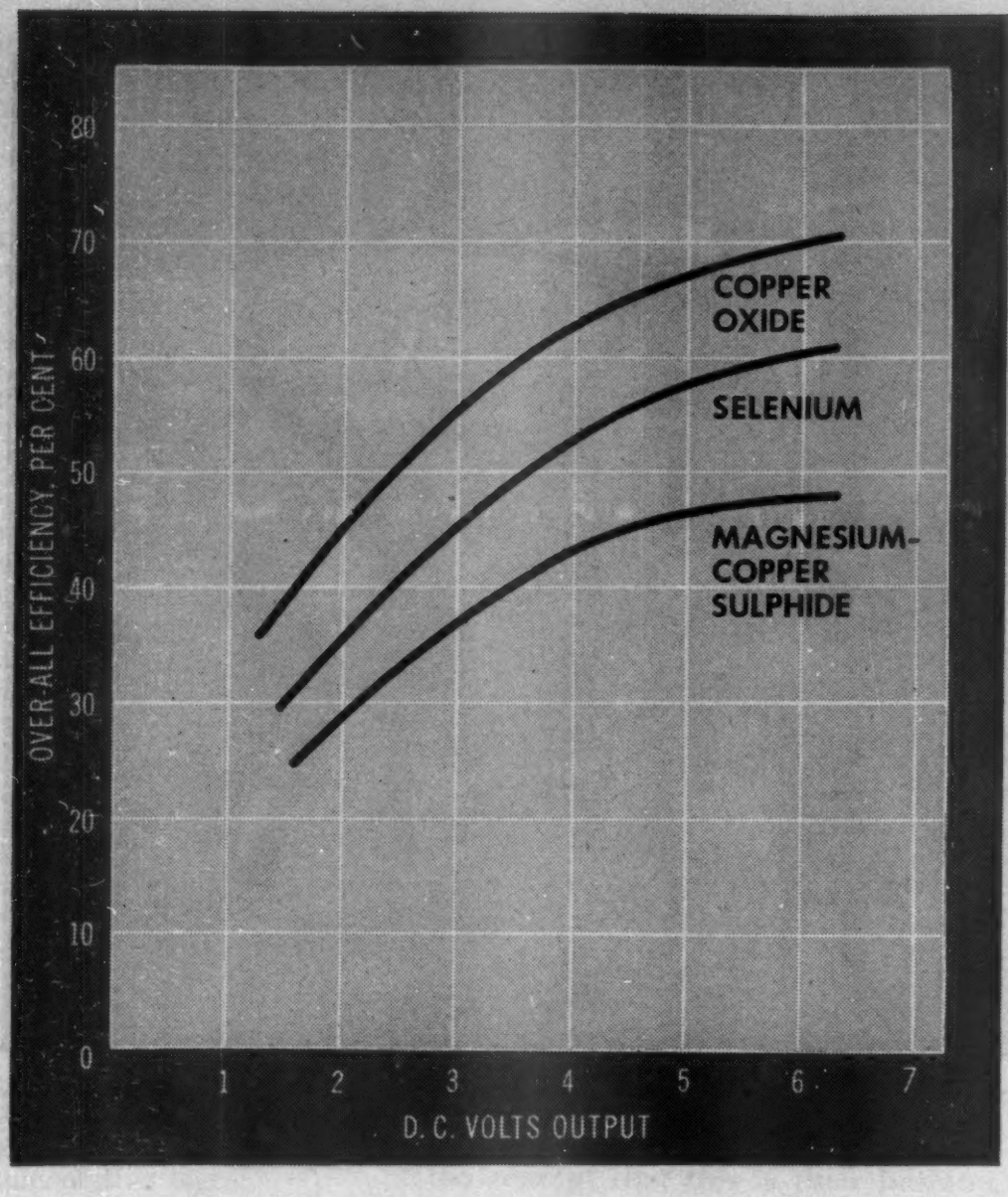


FIGURE 2. Efficiencies of three metallic rectifiers for electroplating service. Units are fan-cooled. All control losses have been included

rents are desired, especially in the very low to medium voltage ranges. These rectifiers consist of assemblies of small rectifier cells in the shape of disks or plates, which are connected in series, in parallel, or in series-parallel and inserted in conventional rectifier circuits, instead of electronic-type devices. These cells are not controlled and the regulation is a drooping characteristic. Control is often accomplished, however, by regulating the a.c. input.

In the United States, three types of metallic rectifiers are in common use: The magnesium-copper sulphide, the copper oxide, and the selenium. In applications requiring only low power, convection-cooled units are used. As the capacity increases to around 2 kw., fan-cooled units appear to be more economical. In high-current units, cooling systems employing oil, water, or air-water heat exchangers may be found.

The magnesum-copper sulphide rectifier is the oldest of the three, the least efficient, and appears to have the shortest life. Improved manufacturing methods and design, however, show promise of increasing the life of this type.

The copper oxide rectifier has now been in use for more than 25 years and has given a good account of itself, so far as life and high efficiency are concerned.

Selenium rectifiers have been manufactured and used in this country less than 9 years, but they show promise of good life.

Both the magnesium-copper sulphide and selenium rectifiers function by means of a film that is formed by the reverse voltage that appears across the cell during normal operation. After long periods of idleness a few moments of operation are required to reform this film, during which time the rectifying action is poor. Therefore, in applications where instantaneous operation is required, as in a blocking rectifier in d.c. circuits, the copper oxide rectifier should be given preference.

In applications that require only extremely low power, it is very difficult to compare the three types of rectifiers, since efficiency is not usually important. However, as the power output increases, efficiency cannot be neglected. Low efficiency means dollars of wasted power and, if figured on an annual basis, amounts to a sizable figure. For electroplating, for example, the copper oxide rectifier is the best type to use at 6 volts or below, since it has the best efficiency.

Applications of Rectifiers

Figure 2 shows typical efficiency curves of the three types. Such rectifiers have been made with capacities up to 150,000 amperes, for use in steel mills.

Above 8 volts the efficiency of the copper oxide and the selenium rectifiers is comparable. Then the choice must be based on cost, life, size, and preference.

In factory applications, metallic rectifiers have been used as convenient sources of direct current to operate contactor coils, relays, solenoids, circuit breakers, magnetic chucks, grinders, clutches, separators, elevators, elevator controls, and d.c. motors and welders. Such rectifiers also have been widely used in charging electric truck batteries, with ranges from 6 to 48 volts, and from 30 up to 200 amperes.

Rectifiers of these types often are found as components of amplidyne circuits, in mercury-arc converter ignitor circuits, and in other specialized controls. Some metallic rectifiers are in use supplying voltages up to 5000 volts d.c. Their use also is quite common in supplying lower d.c. voltages for small radio equipments.

Operating temperatures of the three types of metallic rectifiers are a matter on which considerable confusion exists. The normal operating temperature of the magnesium-copper sulphide rectifier is the highest, while that of the copper oxide rectifier is the lowest. Operating any of the three rectifiers at excessively high temperatures decreases the life quite rapidly. Manufacturers have established certain standards based on laboratory tests and operating experience, to obtain the longest life possible at top efficiency. Their recommendations should be followed whenever unusual applications are involved.

In general, the rectifier that is best suited to the conditions can be selected as follows:

1. If the service is intermittent and loads are of short duration, use copper oxide rectifiers.

2. If space is limited and weight must be kept to the minimum, consider selenium rectifiers.

3. If the voltage is low and the current high, consider the copper oxide type first if top efficiency must be maintained. If efficiency is not important, all three types of rectifiers may be considered.

4. If the voltage is high and the current low, consider the selenium type.

5. If instantaneous operation is desired, copper oxide rectifiers should be considered, since the other two require a short film-forming period.

At this point it is well to consider the d.c. voltage and current wave shapes. The output of any converter may be divided into two components: (1) A pure d.c. voltage, on which is imposed (2) an a.c. component of various shapes, commonly called "ripple." The rms. value of the ripple voltage is expressed as a percentage of the d.c. voltage. The per cent ripple of a rotating converter or generator is small and has a frequency proportional to the speed and number of commutator segments. The ripple of a metallic or an electronic rectifier will have a frequency proportional to the number of phases of the transformer secondary times the supply frequency. The per cent value will depend on the number of phases, the amount of phase control, and the nature of the load. The per cent ripple will increase as phase control acts to reduce the voltage.

Wave Shapes

Ripple must be considered in order to avoid trouble, because the heating in a load supplied with direct current having a ripple content will be due to the rms. value, rather than the average value, of the direct current. Figure 3*A* illustrates the wave shape of a three-phase rectifier in a resistive load, and indicates why increased heating effect is encountered.

The nature of the load also should be considered in rectifier applications, and its effect on current wave shape noted. Resistive loads will draw a current identical in shape to the voltage wave.

Capacitive loads, Figure 3*B*, will tend to increase voltage and cause high peak currents in the rectifier, since it conducts current only when its voltage is greater than the load voltage.

Inductive loads, Figure 3*C*, will tend to smooth out the current wave shape.

Counter-electromotive force loads act like capacitive loads.

Overhauling or pump-back loads requiring reverse current flow cannot be accommodated by a rectifier alone. The use of another set of rectifier tubes connected in inverse to the main rectifier usually is prohibitive in cost. Use of resistors to absorb the pump-back current is possible in small installations. They are generally used in motor drives. However, the cost of d.c. supplies of this type often may dictate the use of m-g. sets for the larger sizes of d.c. motor drives.

Filtering commonly is employed with small rectifiers to reduce ripple to tolerable values. In large rectifiers the cost of filter components makes an increase in the number of phases a more economical means of reducing ripple. In general, a rectifier having six or more phases will supply direct current having a low enough ripple content to be acceptable for most industrial applications.

The ripple of rotating machinery is so low that it is rarely troublesome.

The power factor of the conversion equipment is of importance in many installations. With an m-g. set the power factor will depend on that of the driving motor, which may be either an induction or a synchronous motor.

The power factor of a rectifier normally is lagging, and usually ranges from 93 per cent at full load to 88 to 90 per cent at quarter loads. However, when phase control is employed to vary the voltage, the power factor decreases almost in proportion to the voltage reduction.

At lower voltages the lower power factor must be considered in comparing equipments. A solution that often is possible is to effect large voltage variations, if they are required only infrequently, by changing transformer taps, and to vary the voltage between tap settings by means of phase controls.

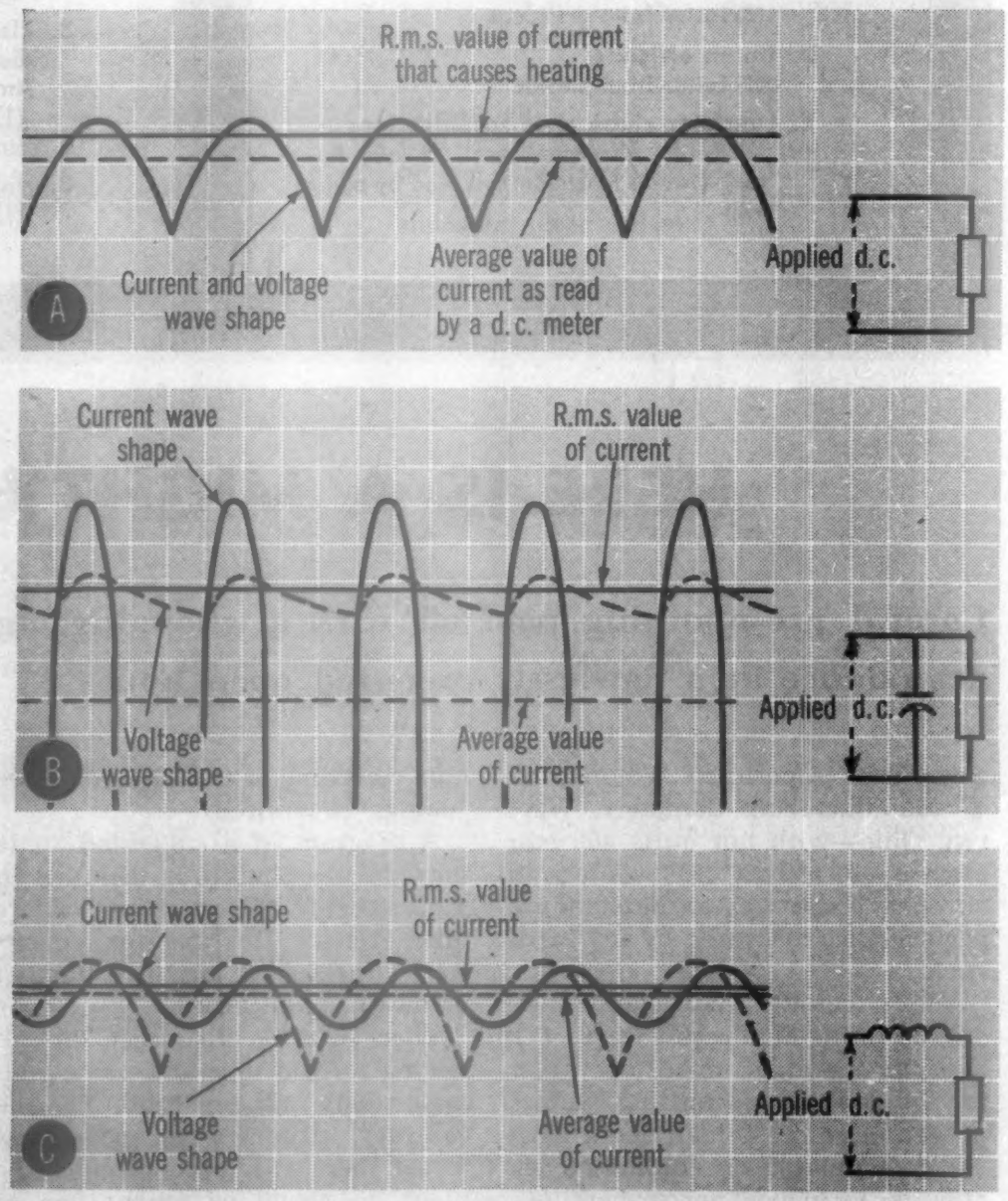
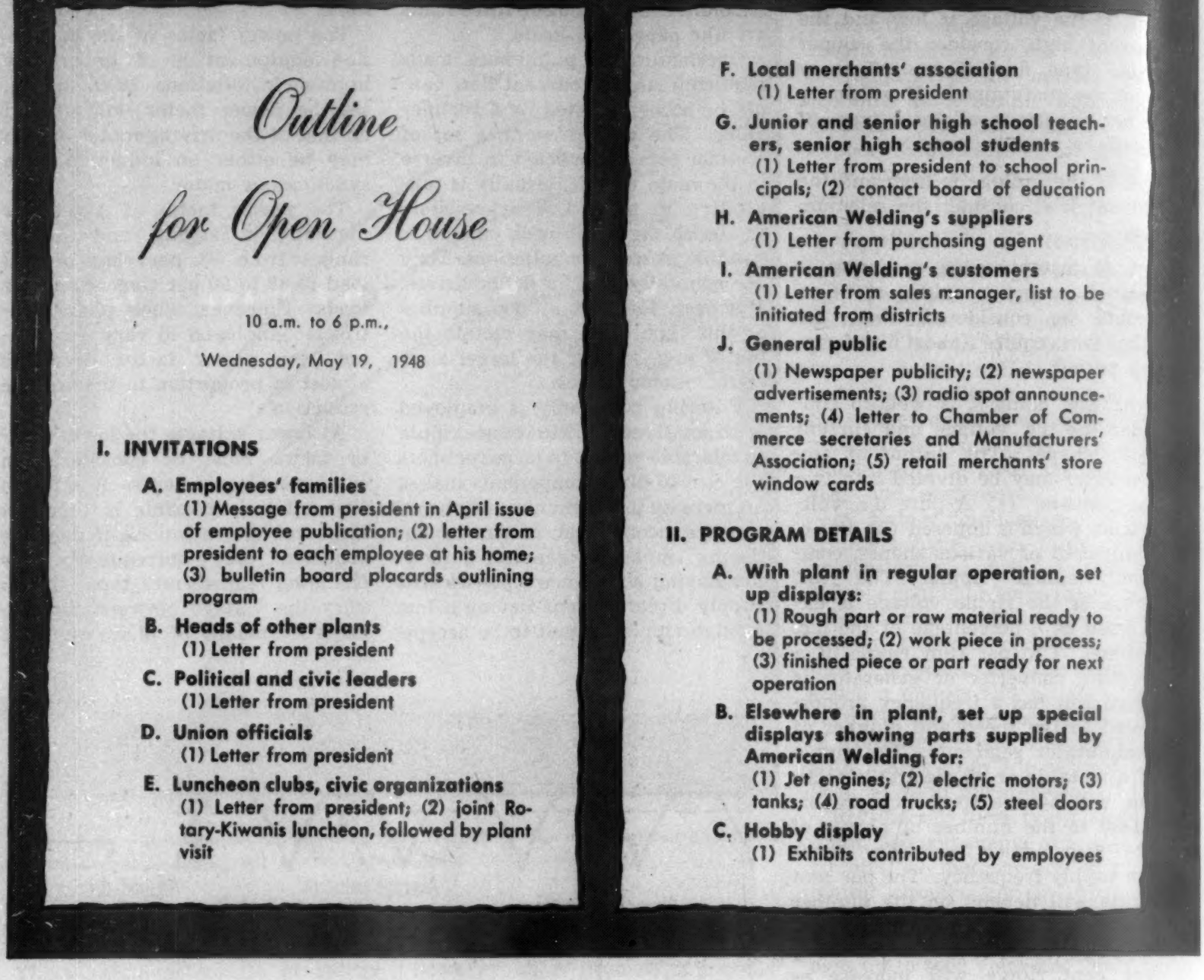


FIGURE 3. Wave shapes of the output of a three-phase rectifier into: *A*, resistive load; *B*, capacitive-resistive load; *C*, inductive-resistive load



Outline

for Open House

10 a.m. to 6 p.m.,

Wednesday, May 19, 1948

I. INVITATIONS

A. Employees' families
(1) Message from president in April issue of employee publication; (2) letter from president to each employee at his home; (3) bulletin board placards outlining program

B. Heads of other plants
(1) Letter from president

C. Political and civic leaders
(1) Letter from president

D. Union officials
(1) Letter from president

E. Luncheon clubs, civic organizations
(1) Letter from president; (2) joint Rotary-Kiwanis luncheon, followed by plant visit

F. Local merchants' association
(1) Letter from president

G. Junior and senior high school teachers, senior high school students
(1) Letter from president to school principals; (2) contact board of education

H. American Welding's suppliers
(1) Letter from purchasing agent

I. American Welding's customers
(1) Letter from sales manager, list to be initiated from districts

J. General public
(1) Newspaper publicity; (2) newspaper advertisements; (3) radio spot announcements; (4) letter to Chamber of Commerce secretaries and Manufacturers' Association; (5) retail merchants' store window cards

II. PROGRAM DETAILS

A. With plant in regular operation, set up displays:
(1) Rough part or raw material ready to be processed; (2) work piece in process; (3) finished piece or part ready for next operation

B. Elsewhere in plant, set up special displays showing parts supplied by American Welding for:
(1) Jet engines; (2) electric motors; (3) tanks; (4) road trucks; (5) steel doors

C. Hobby display
(1) Exhibits contributed by employees

HERE IS A MIGHTY GOOD PLAN

Careful pre-planning paid off with a whopping big attendance at a flawlessly executed open house

FOR The American Welding & Manufacturing Company, Warren, Ohio—with not quite 400 employees—to attract 7340 visitors to an open house was an outstanding performance measured by any yardstick.

Four factors that contributed greatly to the final result were: (1) Keeping the plant in full operation for the day; (2) permitting visitors to get close to actual operations; (3) an estimated 204 column-inches of publicity in local newspapers; (4) a Wednesday noon newscast from the local radio station in which a 27-min. recording of earlier open house "doings" was aired.

A diagram of a suggested route through the plant was included in a "welcome" folder given visitors upon arrival. This was supplemented by the use of brightly painted arrows in plant aisles.

There was no insistence on following a fixed tour and no "standing in line" of any kind. On the contrary, visitors were encouraged to set their own pace through the plant, to spend as much time as they wanted at any point, and to return for a second or even a third look at any process which interested them.

Displays of parts and finished products were set up throughout the plant, with appropriate information on cards.

The fact that the open house coincided with the company's 30th anniversary was used to announce that work was soon to start on another new product. A sample was unveiled, as were the new forming and welding machines about to be installed for the new job.

In an effort to avoid obvious overemphasis of "economic" data, all references of this character were:

1. Well distributed along the line of travel through the plant.

2. Put up at points where the in-

D. **Safety display**
(1) Plant safety; (2) literature on home safety

E. **Plant tours**
(1) Where possible, start visitors with finished products and view operations in reverse of normal processing sequence; (2) permit visitors to set own pace through well-marked plant aisles, assisted by committee men at key points; (3) let visitors get close enough to operations to see them and talk with employees and members of their families at work; (4) permit visitors to linger or to return at will to observe operations; (5) be sure that safety factors are given first consideration at all times

F. **Literature**
(1) Special folder welcoming visitors, with inside spread showing a map of the plant and suggested tour route; (2) special issue of employee publication, emphasizing plant operations and products; (3) all literature to be passed out to visitors as they enter plant

III. ENTERTAINMENT

A. Provide band stand or flat car for bands and orchestras from local schools

B. Provide 75 to 100 chairs near band stand for transient listeners

C. Provide additional chairs throughout plant

IV. REFRESHMENTS

A. Canopy to cover concrete apron in yard where soft drinks, punch, other refreshments served

V. SPECIAL FEATURES

A. Make and record interviews in plant during morning for broadcast over local radio at noon, inviting people to come to the plant in the afternoon

B. Display and identify examples of research and tests in laboratory

C. Place nursery under supervision of uniformed nurses or girls from plant

D. Secure special police, highway patrol, and deputy sheriffs to assist in parking cars, keep traffic moving, and keep road free in front of plant

E. Arrange special transportation between downtown and American Welding plant

VI. EXTRA EQUIPMENT NEEDED

A. Chairs

B. Tables and display places for hobbies

C. Signs

D. Ribbons marked "Committee" and "Reception"

E. Guest identification tags (to be placed in outside pockets); to bear company imprint and to provide space for guest's name

FOR SMALL-PLANT OPEN HOUSE

formation could readily be related to specific operations or equipment.

3. Tied in, where possible, with a collateral interest (such as the guessing contest on the size of the daily payroll).

Costs of "services and materials" such as electric power, gas, and water were expressed in terms of their daily consumption and the number of homes which the same quantities would serve.

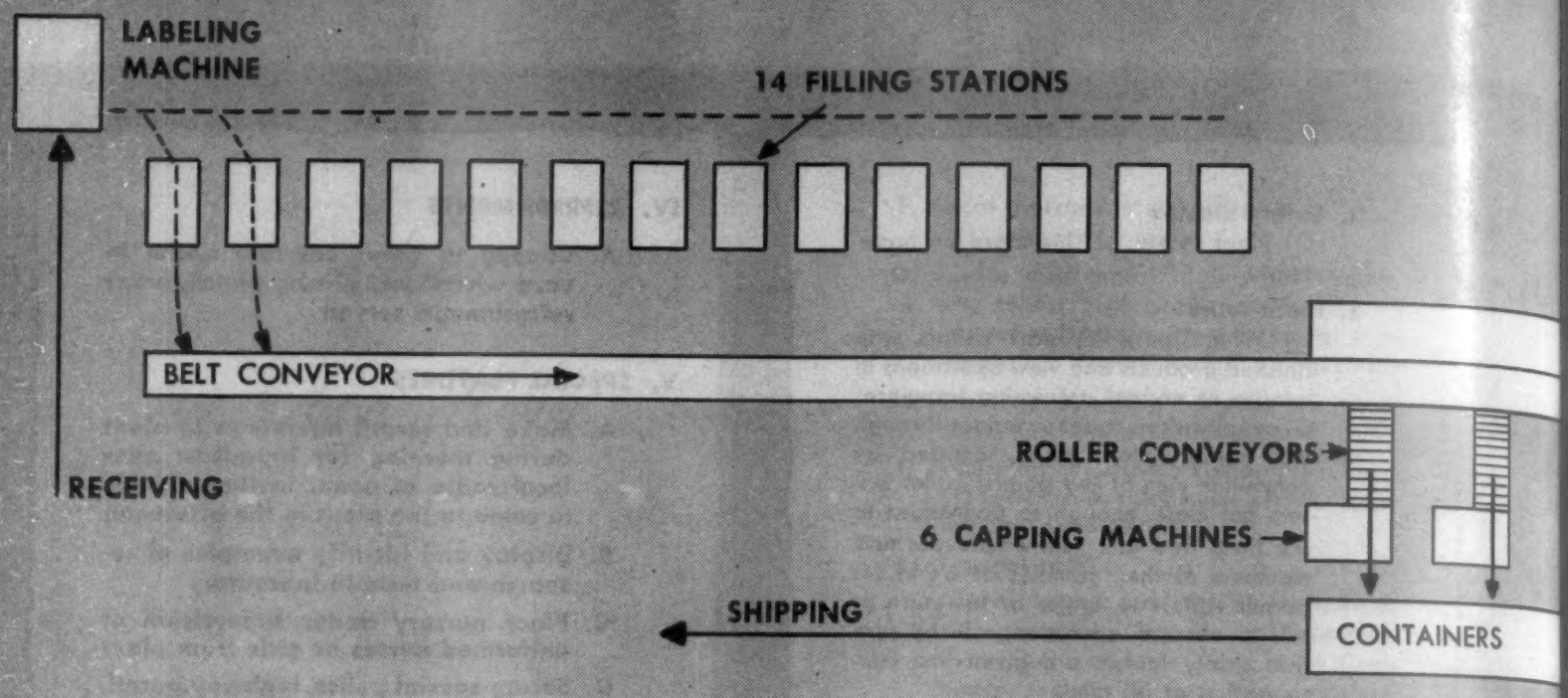
Most popular economic exhibit was a display of approximately 5000 silver dollars, representing a single day's payroll. A cash award of $25 for the closest estimate of the actual money involved prompted several thousand visitors to fill out and turn in cards bearing their names and addresses—the only formal registration of visitors.

Guests invited to participate in the radio "broadcast" as the start of the open house included representatives of city and county governments, heads of local industries, and civic leaders. The station announcer also interviewed men, women, and children picked at random from the ranks of early arrivals. Result was a 27-min. wire recording of actual open house activities, which was put on the air at noon.

Bands from three local high schools performed in two-hour shifts to supply entertainment throughout the day.

No small amount of credit for the success of American Welding's open house goes to the promotional campaign that preceded the program. Promotion started with an announcement in the employee magazine. This was followed by the mailing of printed invitations, which also bore personal messages wherever possible.

Newspaper coverage consisted of releases to five local newspapers (Warren and four nearby towns) at intervals of four days. In all, three releases went out, and paid advertisements were timed to coincide with the last two. Supplemental coverage included installation of store window cards in Warren establishments, and spot announcements over the Warren radio station throughout the three days immediately preceding the open house.



LAYOUT in Wagner Electric's packaging department is designed for motion economy and uninterrupted flow of small parts containers from receiving to shipping departments. Five steps in the pack-

1 AT LABELING MACHINE, boxes are stamped with parts data. Boxes arrive from receiving department in carton (arrow), are labeled, put on trays, moved to . . .

2 FILLING STATION, one of fourteen. Boxes on trays are filled with small parts from properly placed bins and hoppers. Tray, when fully loaded, is placed on . . .

4 ROLLER CONVEYORS. There are six of them, one for boxes of each size on the production line. These conveyors, which are about 12 feet long, provide temporary storage between main belt conveyor and . . .

NEW PACKAGING LAYOUT PROVIDES FLEXIBLE FLOW OF SMALL PARTS

W. A. OKENFUSS • ASSISTANT GENERAL SUPERINTENDENT, WAGNER ELECTRIC CORPORATION, ST. LOUIS

A NEW LAYOUT, revamped methods, and redesigned containers make possible this case study from Wagner Electric. A housecleaning was given the packaging department. Here are ten results:

1. Fourteen different packaging jobs can be done simultaneously.

2. A large over-all volume of many varieties and combinations of parts can be packaged at minimum cost.

3. Small lots can be produced without affecting the packaging flow or economy of operations.

4. Great flexibility permits quick preparation of customers' orders.

5. Difficulties and coordination between operations have been minimized.

6. Handling costs are reduced.

7. Employees' work is made easier.

8. Cost of the product has been reduced at the same time that quality has been improved.

9. Materials are forced to flow progressively with minimum delay.

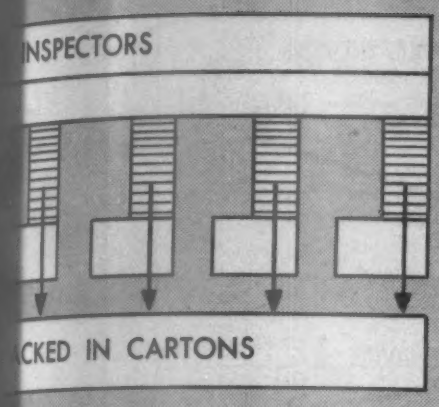
10. Newly standardized containers package 150 combinations of small automotive parts.

Under the old method, packaging operations were carried on at individual, long-line benches. Each operator completely processed single containers for hydraulic brake repair parts.

To initiate the change, containers were standardized in dimension to take any combination of parts. Containers come 250 to the carton and are moved right from the receiving department to the labeling machine.

Work is planned so that each station has a small backlog of work ahead. Unavoidable delays and production hold-ups are being held to the minimum.

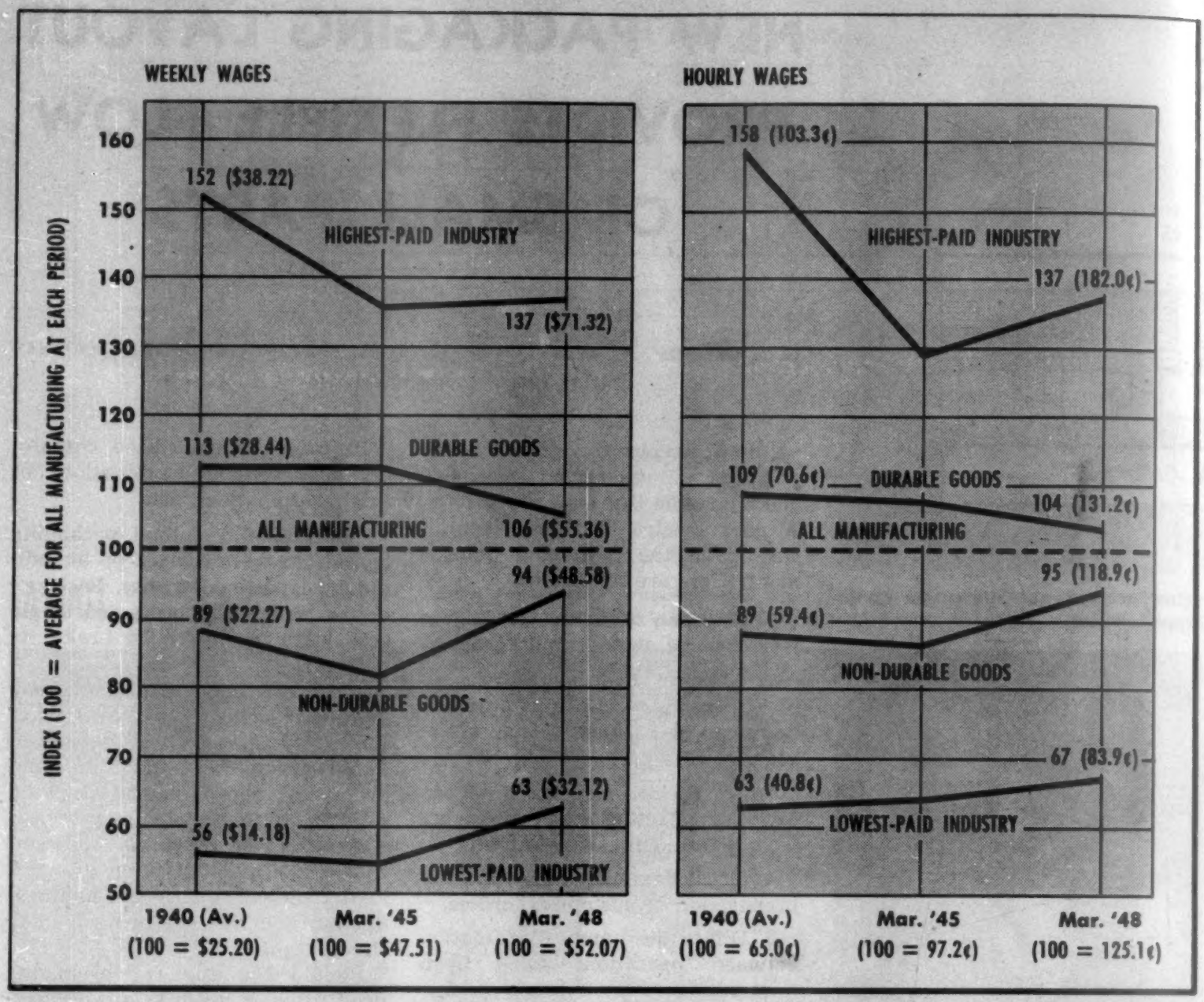
Should the type of packaging need to be changed at a work station, a new set of bins and hoppers is set in place of the old ones by stockmen. The change-over takes about a minute. This arrangement has produced great flexibility in the department. With 14 filling stations, 14 different jobs can be in production simultaneously.



aging process are shown in photographs below

3 MAIN BELT CONVEYOR which carries trays from fillers to inspectors. Trays are shunted to...

5 CONTAINER CAPPING MACHINES where metal caps are crimped to boxes. After being capped, boxes slide down chute to bench. There they are cartoned and moved to truck, shown at right, ready for shipment



NARROWING of the gap between highest-paid and lowest-paid industries, and between durable and non-durable goods industries, is perhaps most important fact gained from analysis of wage patterns since 1940. Figures in brackets on charts show tremendous increase in dollar income, both weekly and hourly, for all groups

WHAT'S HAPPENING TO WAGES

CONTRARY to the old Marxian theory about the "wage-slaves of capitalism," the rich are *not* getting richer while the poor get poorer. That is perhaps the single most importnat conclusion to be drawn from an analysis of the changes in the industrial wage pattern since 1940.

What is happening is that a leveling-out of industrial wages is taking place. The graphs at the top of the page show how this is working. If an index number of 100 is assigned to the average weekly wage for all manufacturing at each period, the spread from the highest-paid to lowest-paid industry, in 1940, was from 152 to 56 (96 points). By March, 1948, this spread had become 137 to 63 (74 points). Similar indexing of hourly wages shows that the spread from highest to lowest was reduced from 158 to 63 (95 points) in 1940 to only 137 to 67 (70 points) in March, 1948.

Comparison of the rates in durable and non-durable goods industries makes a still more striking picture, and at the same time provides a lesson in the dangers of government-controlled economy. The ratio of weekly earnings in 1940 was 113 to 89 (24 points). During the war years, when the government rather than free collective bargaining was largely responsible for setting wage rates, this disparity actually increased. (Indeed, the rich *did* get richer and the poor get poorer.) By March, 1945, the ratio had become 113 to 82 (31 points). But a period of adjustment began almost as soon as free collective bargaining was restored at the war's end in 1945. By March, 1948, the disparity had been reduced to the point where the ratio was 106 to 94 (12 points).

Nor was overtime in the war-working durable goods industry responsible for the 1945 unbalance. The index figures for straight-time hourly earnings in the three periods were 109 to 92, 108 to 87, and, today, 104 to 95.

The fact that the index figure for

INDUSTRY	PER CENT CHANGE IN "REAL" WEEKLY EARNINGS 1940 TO JUNE, '48*	AVERAGE WEEKLY EARNINGS (dollars per week)			AVERAGE STRAIGHT TIME HOURLY WAGES (cents per hour)			PER CENT CHANGE IN "REAL" HOURLY EARNINGS 1940 TO JUNE, '48*
		1940 (Av.)	MARCH 1948	% INCR.	1940 (Av.)	MARCH 1948	% INCR.	
ALL MANUFACTURING	**23.5**	**25.20**	**52.07**	**107**	**65.0**	**125.1**	**92**	**14**
DURABLE GOODS	15	28.44	55.36	95	70.8	131.2	85	9
Machine tools	—3.5	36.97	60.22	63	70.0	137.3	96	16
Automobiles	—1.3	35.76	59.56	67	93.4	150.8	61	—4
Tractors	2	34.41	59.18	72	83.4	141.5	70	0
Machine tool accessories	4	35.33	62.30	76	68.6	142.8	108	23
Ship- & boatbuilding	5	34.81	62.07	78	84.8	150.1	77	5
Aircraft & parts (except engines)	6	31.40	56.28	79	70.3	137.0	95	15
Communicgtion equipment	7	30.51	54.78	80	75.5	131.3	74	3
Electrical equipment	9	30.45	56.23	85	71.7	134.5	88	12
Machinery, and machine shop products	11	31.18	58.29	87	71.9	133.6	86	10
Blast furnaces, steel works & rolling mills	12	31.49	59.26	88	84.0	147.7	76	4
Engines & turbines	14	32.79	63.31	93	76.9	146.4	90	13
Non-ferrous metals & products	15	28.39	55.24	95	69.3	129.6	87	11
Radios & phonographs	18	23.60	46.91	99	60.3	117.7	95	15
Glass & glassware	20	26.63	54.42	104	74.5	132.5	78	5
Stoves, oil burners	22	26.33	54.12	106	66.7	131.4	97	17
Stamped & enameled ware & galvanizing	23	25.51	52.88	107	63.8	127.4	100	18
Railroad cars	23	28.47	58.90	107	73.8	139.0	88	12
Agricultural machinery (except tractors)	23	28.66	59.55	108	71.9	140.0	95	15
Grey iron & semi-steel castings	24	27.91	58.47	109	69.7	134.2	93	14
Hardware	31	23.56	52.38	122	59.1	119.7	103	20
Furniture	34	21.36	48.44	127	53.5	110.7	107	23
Brick, tile & terra cotta	34	20.95	47.54	127	55.6	113.0	103	20
Saw mills & logging camps	36	19.09	43.83	130	49.3	99.9	103	20
NON-DURABLE GOODS	29	22.27	48.58	118	59.4	118.9	100	18
Rubber tires & inner tubes	—1.7	33.55	55.54	66	96.7	158.7	64	—3
Malt liquors	3	35.88	62.57	74	92.4	146.0	58	—6
Baking	7	26.32	47.39	80	61.3	108.5	77	4
Newspapers and periodicals	11	38.22	71.32	87	103.3	182.0	76	4
Industrial chemicals	12	32.17	60.84	89	78.2	143.1	83	8
Rayon & allied products	14	26.38	50.68	92	66.2	125.4	89	12
Petroleum refining	14	34.98	67.48	93	96.3	165.2	72	2
Cigarettes	16	21.97	42.99	96	58.2	110.5	90	13
Printing, book & job	17	30.78	60.96	98	79.6	148.2	86	10
Drugs, medicines & insecticides	18	24.36	48.44	99	59.2	117.0	98	17
Slaughtering & meat packing	20	27.60	56.03	103	66.6	123.1	85	9
Sugar refining (cane)	23	24.25	50.18	107	63.6	116.4	83	8
Cigars	23	15.46	32.12	108	43.0	83.9	95	15
Paper and pulp	32	26.13	58.50	124	62.6	123.1	97	17
Paper boxes	32	21.92	49.02	124	55.0	112.7	105	21
Boots & shoes	33	17.85	40.21	125	52.6	105.5	101	19
Hosiery	35	18.69	42.70	128	55.3	109.3	98	17
Men's clothing, not elsewhere classified	37	19.31	44.73	132	59.3	117.1	97	17
Women's clothing, not elsewhere classified	45	19.65	48.07	145	53.8	129.4	141	43
Shirts, collars & nightwear	47	14.18	35.10	148	42.0	92.3	120	30
Woolen & worsted manufacturing	55	20.33	53.36	162	55.8	127.4	128	35
Cotton manufacturing (except small wares)	75	14.85	43.98	196	40.8	104.6	156	52
Silk & rayon goods	75	16.33	48.53	197	45.5	109.9	142	43
NON-MANUFACTURING INDUSTRIES								
Telephone	—14	32.44	47.31	46	80.8	120.0	49	—12
Electric light & power	—1.7	35.10	58.27	66	86.3	134.5	56	—7
Crude petroleum	10	34.03	63.44	86	86.7	156.6	81	7
Bituminous coal	79	24.71	74.61	202	88.3	179.0	103	20

*NOTE: Change in "real" wages computed by adjusting actual increase for rise in cost of living (1940=100.2; June, 1948=170.5)

Data: U.S. Bureau of Labor Statistics

the durable goods industry has decreased does not indicate a wage cut. Anything but. Since March, 1945, hourly earnings in durable goods have risen by 25 per cent. To wipe out the disadvantage, partially at least, of workers in non-durable goods, hourly wages there have increased 40 per cent since March, 1945.

In other words, wage increases are coming easiest where they are needed most. Industries in which the 1940 weekly wage was below the all-manufacturing average have shown gains in real earnings of 16 per cent or more. Except for cigars, the nine industries in which 1940 wages were one-fifth or more below average have shown gains in real wages of 33 per cent (minimum) to 75 per cent. *But industries in which the 1940 weekly wage was a third or more* above *average have shown gains of 5 per cent or less.*

Yet, through all this shaking-out, in only three industries has the *real* weekly wage failed to increase —*machine tools, automobiles,* and *rubber.* In 1940, earnings in those industries ranked 2, 4, and 8, respectively, among the 46 manufacturing industries reported. Even with the very slight drop in real wages, today they rank 8, 9, and 20. (It is to be noted that the figures reported by BLS do not yet reflect the recent increases granted by many large companies in the automotive and rubber industries.)

The reason for the big drop in the position of the rubber workers is the saturated market currently plaguing the industry. On an hourly basis, rubber workers are the third best paid in America, but they were only working about 35 hours a week in March of this year; practically every other industry was running 40 hours or more.

The drop in real weekly earnings of the machine tool workers has a simple explanation, too. In 1940, the machine tool industry was already flooded with defense orders, from both at home and abroad. consequently, earnings averaged 53 hours of straight-time pay. So, despite the fact that machine tool workers ranked 19th on an hourly basis, their total average weekly pay was the second highest of any industry. If the calculation is based on a 40-hour week, real earnings in the machine tool industry have increased by 16 per cent since 1940.

In the non-manufacturing industries, the coal miner's wages have been the subject of much discussion. The use of index figures sheds some interesting light on this matter. Related to the all-manufacturing average (100), the miner's hourly pay in 1940 was 136. In March of this year, although the absolute figure had doubled, the index had risen only to 143. In other words, *relative to the rest of industry,* the miner was very little better off for straight-time pay than he was in 1940. In terms of "real money," hourly wages in manufacturing have gone up 14 per cent; for the miner they have gone up 20 per cent.

But when the total weekly wage is used as a base, the miner's earnings have skyrocketed. His "real" income has increased by 79 per cent, compared to 23.5 per cent for all-manufacturing. Probably the single factor most responsible for this increase has been portal-to-portal pay. In 1940, a miner averaged about 28 hours' pay per week—he was paid only for time spent at the working face. Today the miner is paid from the time he enters the pit—and he is averaging about 42 hours of straight-time pay.

The result is that the miner's weekly wage has increased from less than the manufacturing average to a point 43 per cent above the average for manufacturing.

SET UP TO BURN EITHER COAL OR OIL

DAVID MOFFAT MYERS • MYERS, FULLER & ADDINGTON
NEW YORK

IN LOCALITIES where both fuel oil and coal are available it is a great advantage to be able to burn either fuel in order to safeguard factory production. More total fuel storage usually can be obtained than when depending upon one fuel alone. Also, advantage can be taken of fluctuations in the relative market prices of the respective fuels.

A boiler furnace designed for coal burning usually can be adapted for oil firing. However, one that is designed for oil firing may suffer a substantial loss in capacity when changed to burn coal, chiefly because of the larger volume of combustion space required for the solid fuel, which is further reduced by the introduction of a stoker or grate.

The ideal arrangement is to have your boiler plant so designed that without any changes in physical equipment the operation can be switched from oil to coal on practically a moment's notice.

An excellent way of accomplishing this, and one that is widely practiced, is to have the boiler with its furnace designed for pulverized coal, with combination coal and oil burners, and complete equipment for the preparation, handling, and storage of both fuels. Fly ash collectors should be incorporated.

It is well these days to construct all coal-burning plants with very ample furnace volume and moderate combustion rates to permit burning the lower grades of coal, which will continue to becomes more prevalent as time goes on.

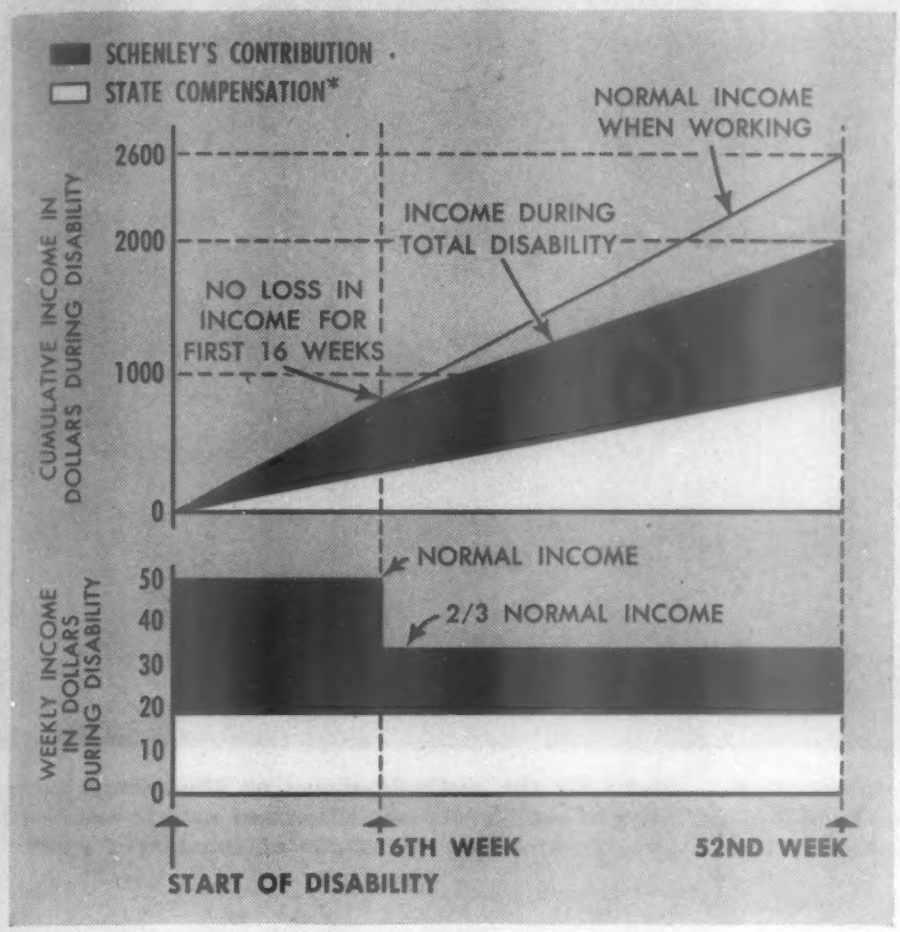
Other methods for achieving alternative fuel firing do not offer so nice a solution, or usually such a quick and simple switch-over from one fuel to the other. It is best to remove the stoker or grate completely when changing from coal to oil, and the boiler front and furnace should be designed with this operation in view.

In some cases it may be feasible to leave the stoker or grates in the boiler and protect them when firing oil by a prepared system of insulation and air cooling. Complete removal of the stoker is the better way, however, and will usually involve less trouble and little or no more expense. Furthermore, the oil burners can be built into their special boiler front most advantageously for efficient operation.

The sketch shows in cross-section a design for a modern industrial boiler plant arranged for alternative firing of coal and oil.

HOW SCHENLEY COMPENSATION PLAN WORKS

EXAMPLE: *A DISABLED WORKER EARNING $50 A WEEK*



Worker in Kentucky distillery earns	$50.00	weekly
First 16 weeks...		
From state workmen's compensation*	18.00	"
From Schenley, for 16 weeks	32.00	"
Total per week for first 16 weeks	**$50.00**	
After 16 weeks...		
From state workmen's compensation	$18.00	"
From Schenley for 36 weeks	15.34	"
Total per week for 36 weeks	**$33.34**	
Normal year's pay	$2,600	
Year's pay if disabled	2,000	

*Amount paid by workmen's compensation differs in various states. Schenley plan pays any difference between amount received from the state and the worker's regular pay

PROTECTING DISABLED WORKERS FOR A FULL YEAR

H. C. PHILLIPS • DIRECTOR OF INDUSTRIAL RELATIONS, SCHENLEY DISTILLERS CORPORATION, CINCINNATI

DISABLED WORKERS at Schenley are now assured full regular income during the normal period of convalescence. And financial protection for a full year.

All this by extending our employee security plan to supplement workmen's compensation benefits.

While the safety program continues to stress good housekeeping and accident prevention generally, it was recognized that, despite all precautions, accidents do happen. Disability payments under workmen's compensation in some states are inadequate to see an employee through a trying period. Predicated on pre-war wage levels, they fail to meet today's higher living costs. So, in March, supplemental benefits were instituted.

For the first 16 weeks of total disability, Schenley makes up the cash difference between whatever amount the employee gets from workmen's compensation and his full normal pay. If disability continues beyond this period, the plan pays the worker the difference between workmen's compensation and two-thirds of his regular check for as many as 36 more weeks. Thus financial protection is afforded for a full year.

Another important phase of the plan deals with temporary incapacity resulting from occupational accident or illness. Assume a workman is hurt on the job, but is able to handle some lighter but lesser-paying work in the plant. If that employee's regular wages were $55, for example, and the lighter job paid $40, workmen's compensation and the Schenley plan combined will make up that $15 wage difference for as many as 16 weeks.

It makes no difference whether the disabled or incapacitated person is an hourly rated, salaried, plant, office, union, or non-union employee. About 13,000 Schenley workers are covered.

PRODUCTION CONTROL center, where information is received over facsimile writing machine from production departments and from inspector at receiving dock. By the methods shown on the facing page, the bank of machines above allows one man to exercise complete control over thousands of component parts

VISUAL CONTROL CUTS CLERKS

Graphic charts for each part can be rolled into view on special machines for quick visual inspection

H. B. JONES • VICE-PRESIDENT IN CHARGE OF OPERATIONS
LION MANUFACTURING CORPORATION, CHICAGO

A NEW production control charting system is saving thousands of dollars a year by minimizing production losses at Lion Manufacturing. Paperwork has been reduced by more than 85 per cent. Material shortages are now virtually unknown. And stock surpluses are gradually being eliminated.

All these advantages are being realized through installation of visual control methods in place of paper records. Now, management can get answers in minutes, which required hours before.

Control charts are made up for each production unit with all components for that unit listed. The charts are made on graph paper 32 inches wide by 50 yards long. The graph paper is wound on "feed" and "take-up" reels, which are placed in a compact, lightweight, motor-driven machine.

A gear shift, on the left side of the machine, enables the production control clerk to shift the machine into "forward" or "reverse" feed. On the right side is a rheostat button that gives the operator variable speed control of the records as they pass before his eye.

The master assembly schedules, made up weekly, are placed at the top of each machine. This record is made on the same type of graph paper as the component graphs. It is placed in position, and remains stationary for quick visual comparison with the individual part graphs in the machine. Components, of course, must equal in quantity the number of final units to be built.

Each component part for each master assembly has an individual graph on the rotating paper. The parts are listed one inch apart. Thus, up to 1800 components can be listed in each machine. The information contained on each listing is as follows: Part number, part name, and quantity required per assembly. A fourth element is the actual line representing the quantity of the part in the plant. The length of the line must equal the length of the line on the master schedule if the assemblies planned for the week are to be built.

A color code is used for the lines as follows: Blue, parts processed in the plant; red, parts purchased complete; and green, parts "borrowed" from less critical production assemblies. Borrowed parts are repaid to the "lending" assemblies when replacements are received from production or the supplier. The

SPECIAL TEMPLET (top) is scaled to correspond with graph paper, enables clerk to make postings accurately, neatly, and rapidly. GUIDE BARS (bottom) are set to correspond (left) with present production point and (right) planned schedule point. Graph is then rolled, electrically, past viewing area to show shortages

FROM THREE TO ONE

bars are of two types: Solid color bar, parts received for specific assembly; and "open line" color bar, parts taken out of surplus stock.

There is a separate control machine for each assembly, and an individual control bar chart for each component part that makes up the assembly. If the component part is used once for each assembly, the scale on the component graph is the same as the master scale. However, if the component is used twice for each assembly, the scale is one-half the master scale.

Information is received in the production control department over facsimile writing machines connected with the receiving room (purchased parts) and the routing department (parts processed in the plant). The tickets on which the information is received are taken by the production control clerk and posted to the individual part graphs for each assembly.

A special templet is used by the clerk for posting. The opening in the templet is the exact depth of the lines to be drawn. This assures neatness and accuracy in adding to the graphs. The templet also has scale lines etched in its surface to match the scale used for the production units.

Five machines are used for regular production assemblies; some have two or three assemblies in each machine. In addition, there are two machines specifically assigned to the listing of surplus parts in the plant.

The "surplus" machines carry individual graphs on each part in stock over and above current production requirements. The purchasing department, before ordering any parts for a new release, checks the graphs. Orders are placed only for parts that cannot be taken from surplus stocks. When a part is found on the "surplus" machines, it is "transferred" to the proper master assembly chart. The same procedure is followed by the production control department before ordering processed parts to be made in the plant. As a result of this procedure, excess stock has been reduced more than 50 per cent, and valuable storage area has been freed for other uses.

Weekly management meetings are held in the production control office at which all future planning is done. Each machine is set at the beginning of the tape and the controls are set at slow speed. As the graph for each part moves into view, it is checked against the master schedule on the top of the machine. When a shortage is noticed, the machine is stopped, and the group discusses what corrective action can be taken to meet the schedule.

Yet only one production control clerk is required to keep the entire system operating efficiently. Formerly, three clerks were needed to make the postings and prepare the management reports.

As a result, thousands of dollars are being saved each year. More accurate records are being maintained. And, literally, tons of paperwork has been eliminated.

OPERATING SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary operating accomplishment. Accepted articles will be paid for

POWER TRUCKS CARRY WELDING EQUIPMENT

Power trucks have replaced hand trucks for transporting welding equipment and supplies around the factory at Automatic Transportation Company, Chicago.

Moving heavy welding equipment and supplies by hand truck was fatiguing and cost the company valuable time. So the maintenance department equipped small power trucks to accommodate either oxy-acetylene or electric-arc welding equipment.

Each truck carries welding rod, a fire extinguisher, and a tool box, in addition to welding equipment. The welder has everything at his fingertips and need not lose time looking for equipment.

These welding trucks are kept in a special division of the maintenance department, and are available at any time to any qualified welder, for emergency or production welding throughout the plant.

Considerable gas and arc welding is required on the many assembly lines set up for production of materials handling trucks. Formerly, it required two or three men to move the necessary equipment and supplies to any particular area for welding. Now, one worker can easily move all equipment to the job site. He can do it in less time, too.

The results add up like this—work is made easier. Excessive fatigue required to push hand trucks has been eliminated. Accident hazards existent with hand trucks have been reduced. Time required to move from one job to another is less. Welders no longer have to search for equipment or supplies.

CAFETERIA "RUNNERS" FACILITATE SERVICE

Cafeteria "runners" facilitate employee lunch service and eliminate confusion in the cafeteria and canteens at Stewart-Warner Corporation, Chicago. These runners, with specially identified orange boxes bearing S-W insignia and numbers, make selections of food requested by their particular group.

Authorized runners are sent a few minutes before the rest period and lunch period either to the main cafeteria or to one of the canteens. Only runners, bearing the special boxes, are served in the cafeteria before the regular lunch time. It is their responsibility to make the selection of food requested by their group.

Before this system was installed, every employee went to the cafeteria or canteen to make his individual selection. As a result, service was slow and the cafeterias and canteens were overcrowded. Now service is fast, and there is no more confusion.

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LARGE QUESTION MARK on suggestion boxes throughout the plant attracts employee attention at Mechanics Universal Joint Division, Borg-Warner Corporation, Rockford, Ill. Seems to create "questioning attitude" on part of employees. Suggestions have increased considerably since these boxes were installed

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BUSES TRANSPORT WORKERS DAILY TO NEW PLANT

RICHARD A. DEY, Personnel Director, Shulton, Inc., Clifton, N. J.

This company was faced with the problem of retaining highly skilled workers when it moved operations over a year ago from the city of Hoboken to the suburbs of Clifton, 20 miles away.

Most of the employees lived in the immediate vicinity of the old plant. The tight housing situation made mass home resettlement impossible. No means of direct inexpensive public transportation between the two points was available. Indirect routes would have required over 1½ hours traveling time each way.

The problem was solved by chartering special buses to take employees in the morning from Ho-

boken to Clifton, and return them after work. A nominal fare of 10 cents each way was charged each worker.

Plant operations continued smoothly from the first day of the change-over. The extra expense to the company was justified, if for no other reason, by the elimination of the added burden of training a new corps of workers.

Employee morale remained high. Also, quality and productivity did not suffer. Whenever old workers quit, they are replaced by local residents. But special buses will be used for employee's convenience as long as they are needed.

DAILY PERSONAL INSPECTION INSURES SANITARY PRODUCT

Over five hundred girls are inspected daily for general cleanliness and observance of personal safety rules at the Dixie Cup Company's Easton, Pa., plant. Before reporting to duty as machine operators, the girls stand inspection before the company's first-aider. They are carefully checked for compliance with company rules on the use of hair nets, nail polish, head bands, cosmetics, length of sleeves, shoes, uniforms, jewelry.

Control is easy. Each girl must pass the inspector in order to reach the time clock.

BUILT OBSERVATION CAR FOR OPEN-HOUSE TOUR

Many of the problems attending open-house tours in a large steel plant were solved simultaneously at Worth Steel Company, Claymont, Del., by two observation cars.

The cars were easily constructed from standard flat cars by adding bench seats, protective overhead canopy, and wire guardrail enclosures. A company diesel yard-engine was assigned to each car, which comfortably held 90 persons.

Refinements included overhead lights and a loudspeaker hook-up for each car, so that guides could be heard by all as they described operations and scenery during the tour.

Since the plant tour took 1½ hours, tours were arranged, by definite time schedule, every three-quarters of an hour. Trips were planned for two days between 9 a.m. and 5 p.m., but proved so popular the time was extended to 10 p.m. for six days.

The advantages to visitors and the company were many. Visitors had definite starting schedules, were more comfortable and less tired, and were better able to see everything. Large groups could be handled at one time and without fear of "strays." Cars could be brought more safely into all areas of operation and closer to operations than would have been possible with visitors afoot. Interference to production was cut to a minimum.

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NO RIGGING NEEDED WITH THIS ROOFING METHOD

SOURCE: Nelson Stud Welding, Division of Morton Gregory Corporation, Lorain, Ohio

A method of applying sheet-metal roofing materials that reduces direct application costs more than 50 per cent has recently been developed.

In conventional methods, roofers must stand below the roof and secure the sheet metal by putting straps around the steel purlins and bucking up rivets for roofers working on the top side.

The new method enables roofers

to do all the work from the top side only. An electric arc stud welding gun end-welds studs to steel purlins and eliminates the need for erecting scaffolding under the roof. Operations are much simpler and can be put on a production basis.

The steps in applying the roof are as follows:

1. Rivet studs are end-welded to the steel purlins, generally on 6-in. centers or to the same specifications as the manufacturers of metal roofing require for other fasteners. Studs are located by a lightweight templet.

2. After the stud welder welds the studs into position on the steel purlins through the templet, a member of the installation crew places the corrugated sheets in position.

3. A sheeter drives the rivet extension through the corrugation crown by striking it with a rubber hammer.

4. Another sheeter follows with a machinist hammer and upsets and rounds off the rivet cleanly with a rivet set.

In the installation shown a shoulder type stud, 5/16 inch in diameter by 11/16 inch to the shoulder, with a 3/16-in.-dia. extension is used. Length of the extension is ½ inch at corners where four layers of roofing are lapped, and 5/16 inch elsewhere. Side laps between the purlins are secured by self-tapping screws. When used with protected metal, the rivet studs are slightly larger and a washer is used.

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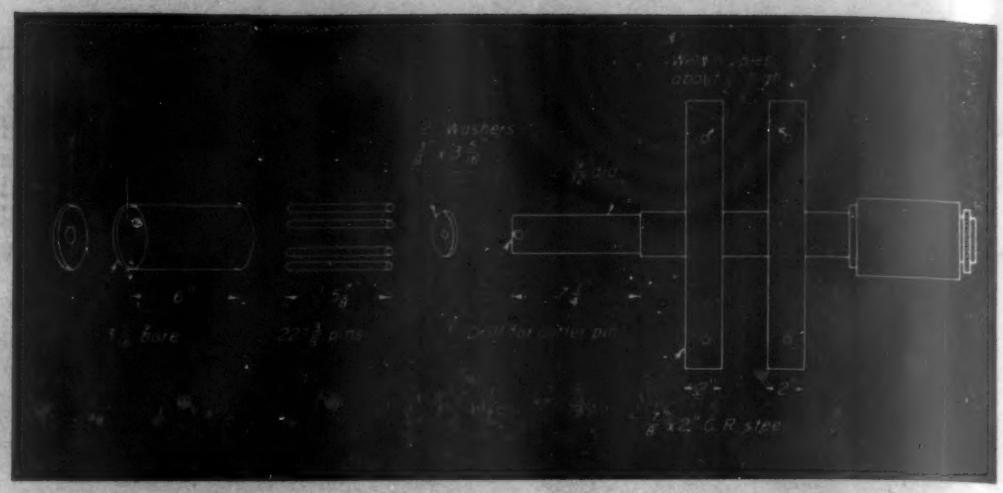
SPRING BUMPERS (arrows) on all factory doors enable truck drivers at Harnischfeger Corporation, Milwaukee, to get around the plant faster. Drivers merely hit the bumpers on the doors and drive through. No more need for an extra worker to ride along or for the driver to stop the truck in order to open doors



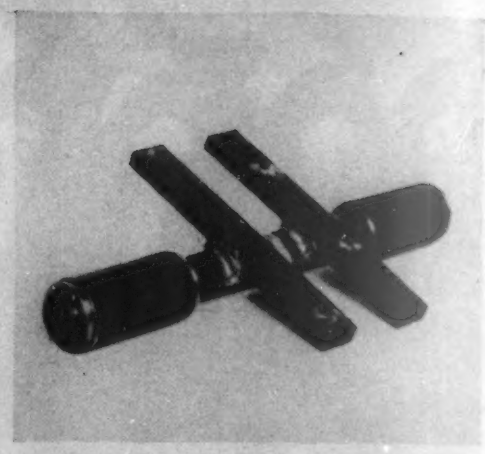
HOME-MADE ROLLERS MOVE HEAVY PRESSES

GILBERT LINDGREN, Troy, N. Y.

A home-made roller has proved most satisfactory for moving heavy presses over wood-block flooring. Four rollers can handle a 35-ton press.

The press is jacked up and two 4x10 sleepers are placed in position. The buttons welded to the cross bars dig into the wood and hold the rollers in position.

Outer races are cut from tubing used in the plant; the ⅞x2-in. cross bars and the ⅜-in. pins are cold-rolled steel. The shaft is turned from worn-out forged steel shafts. Of course, the rollers are packed with grease.



TURNTABLE FIXTURE SOLDERS AUTOMATICALLY

E. A. MAX, Chief Tool Engineer, South Wind Division, Stewart-Warner Corporation, Indianapolis

An automatic turntable fixture for silver-soldering igniter coils and studs has resulted in a production increase of 235 per cent at South Wind Division, Stewart-Warner Corporation, Indianapolis. This work used to be done entirely by hand. Studs and coils were placed in a straight line, and workers silver-soldered them.

Now there is no more hand soldering. Workers place coil, stud, and silver solder on a rotating turntable fixture. An oxyacetylene flame mounted in semi-arch (arrow) prewarms and solders the pieces, which are cooled as they ride around the table until they drop off automatically into a chute.

Over 1900 man-hours per year are being saved, and the work is far easier.

LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

A YEAR of labor peace, then—bong—Round Four.

That's the outlook as employers and unions watch third-round post-war wage increases — about $1 a day — go into pay envelopes and statistical tables.

Another round next July is a cinch. Only a big break in the economy—and nobody's looking for one—can stop it. Only real question is: What will Round Four be like?

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To chart the future we look at the past. Underlying support for the first three wage boosts came from a rising price index—130.9, 156.2, 169.3. Those are April figures for the past three years.

As consumer price rises slackened, wage raises lost fat—18½ cents, then 15-cent "package," and, this year, a more flexible range of 9 to 13 cents.

While the index continues to rise, labor leaders will tie their kites to it. Next April's index figure will be the key to cost-of-living demands. It's due to go still higher, not down.

General Motors and two CIO unions will chase the index—up and down—for two years. In other big industries, however—coal, steel, electrical machinery, and Chrysler—negotiations will take shape next June. Latest price index figure at that time will be April's. That's why it's the one to watch.

Management must be prepared, as always, for more than breadbasket demands. Unions aim to improve living standards, not maintain them. Again we must examine the past for telltale signs.

Here's what we see. Labor leaders next year will want to cash in this year's rain checks. To put it another way, they will renew old demands and try to match what others already got. This is what we mean:

WELFARE FUNDS. John L. Lewis and NLRB tossed pensions and sick benefits on every bargaining table. Kaiser-Frazer broke the social insurance ice in autos, Allegheny Ludlum in steel. U. S. Steel, on the verge, gave a wage increase instead.

ANNUAL WAGE. Pressure for more take-home pay to cope with living costs shunted this major post-war goal. It will hop to the fore when the price rise halts and layoffs threaten. UAW-CIO scored in the auto industry with a 50-week guarantee for 10-year men in a parts plant.

PRODUCTIVITY. It's rising, and unions will want to share the benefits. GM concedes a 2 per cent "annual improvement factor" in 3-cent automatic raises this year and next. Others will pick up the idea.

VACATIONS. Demands for three weeks with pay will spread. CIO electrical workers get it after 15 years at Sylvania, 20 years at Westinghouse and General Electric.

PAID HOLIDAYS. Unions won six holidays during the war from WLB, now want more. CIO got a seventh — Washington's Birthday — from Westinghouse. A Machinists Union contract in New York gives eleven paid holidays.

Customary Saturday, Sunday, and holiday time and a half (when worked) will come in for scrutiny by many employers. Beginning September 15, the Wage-Hour office will not consider those premium payments as legally required overtime unless those days normally occur during overtime hours.

Legislation by Congress may affect the pensions, social insurance, and overtime issues. There's sentiment on the Taft-Hartley watchdog committee for taking these issues out of the realm of compulsory bargaining.

On overtime, the 1938 Wage-Hour Law is due for overhauling. If it comes, "overtime on overtime" will be killed. Meanwhile, look for the administrator to tighten exemptions for white-collar workers.

Railroad unions begin third-round negotiations while Congress wonders what's hit its model Railway Labor Act. In two years we've had 12 railroad and 4 airline strikes. Only government seizure and an injunction prevented a nation-wide stoppage in May.

Experts poking into the situation come up with an old answer—compulsory arbitration. The Senate Labor Committee talks about it. But railroad maangement doesn't want it. Nor do the unions, or the Railway Labor Board.

Actually, the railway law is suffering from war and post-war upset. There'll be no changes made.

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Clague's plan to revise components in the consumers' price index got poor reception from BLS management advisory committee. A change would push index higher, bolster new wage demands, upset escalator clauses like GM's. Clague may do it anyhow, keep unrevised index for GM.

Dewey can replace the most pro-labor NLRB member if he wins. He's John M. Houston, ex-New Deal Congressman, whose 5-year term expires this month. Congress has withheld confirmation for new term.

ECA's labor policies will get critical inspection from Vincent Ahearn, ex-NWLB industry member. As ECA industrial relations consultant, Ahearn will give Hoffman the pitch on all labor recommendations.

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

ARE we headed for another year of inflation?

Business awaits release of the consumers' price index for July with new interest. General Motors will have to adjust wages on the basis of the July report, scheduled for release about August 20. More important, the index will measure the effect of recent jumps in food costs and may reflect some price increases following third-round wage hikes.

Already unions representing 10,000,000 to 12,000,000 members — in virtually all major industries — have won raises averaging close to 12 cents an hour. Many of the raises were promptly followed by price increases. Increases in the basic coal, steel, and rubber industries affect almost everyone.

On top of that, some unions are already talking of a fourth round. Their argument: Wages since the end of the war have not kept pace with cost of living.

Then, too, government spending is increasing. Rather than running a $7-$8 billion surplus in 1948-49, the federal government will come close to breaking even, which takes off an important deflationary brake.

That's the background behind the problem President Truman threw at Congress. But hopes that Congress can or will do anything effective about it are slim. Long-range measures — such as enacting the new monetary controls advocated by the Federal Reserve Board — would slow down inflation in time. But there's little Congress can do that would show results before election time rolls around.

•

What the third round means to business can best be seen by estimating the new surge of prices.

Industrial prices, which are steadily moving upward, are likely to show a 7-8 per cent gain in the last six months of 1948.

Wage increases are on the order of 8 to 9 per cent, true. That's more than the gain in output per man-hour in the last year, but increasing productivity will absorb some of the increase in wage costs. And some companies will cut their profit margins under competitive pressure.

Food costs are nearing their seasonal peak, are likely to level off this fall, to drop gradually next year.

Other components of the index, like rents, are moving up steadily. Incidentally, look for revisions of the index sometime in the next year to allow for higher rents in new construction.

Best estimates of the course of the consumers' price index show it rising gradually. At about 170 in June, it may go as high as 176 or 177 in December.

But by that time, although the slow-moving items like rent and bus fares may still be inching upward, 1948's bumper harvests should begin to lower food prices. Winter wheat overflowed the elevators in June in what is perhaps the second biggest crop in history. Corn promises to be a record 3.3 million bushels, by far the largest crop ever produced.

All in all, with 1948's bumper crops, economists look for a definite leveling off in the consumer price index next year.

•

The Senate's double-barreled investigation of the steel and cement industries' switch to f.o.b. mill pricing systems may put a yardstick on one thing — the confusion in industry caused by the change. But the first month's experience with the new systems shows that immediate effects are small.

Cost-wise, the steel industry's general advance in prices, following announcement of third-round wage increases to steel workers, probably meant more to most steel users.

Competitively, the switch to f.o.b. mill pricing means little in the short run. Customers are taking all the steel they can get. The steel industry has been absorbing less freight per ton on the average than it did pre-war because cross-hauling was cut down during the war. And steel users located at long distances from the mills have always had to pay substantial freight charges. They bought their steel at basing-point prices and paid freight on it from there.

For example, to West Coast companies buying steel products made in Birmingham and on which the basing-point was Birmingham, the change to mill prices means little. They will still pay the same freight bill. In fact, in some cases these companies may gain. Competitors nearer the mill may now have to pay more for steel than they did formerly.

In the long run, the switch from delivered pricing systems may have major impact on American industry. In any case its coming now is important in one way to every company. It means that this is the time for a long-range review of the future effects of pricing system changes *and* changes that have come about since World War II began in material costs, transportation costs, and markets. Population changes and changes in regional income alone open major new markets for many industries.

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So, from industry's viewpoint, the switch to f.o.b. pricing signals that this is the time to work out in detail the answer to the question: "Where will we be going in 1955?"

BAKER FORK TRUCK

BAKER ARTICULATED FORK TRUCK

Battery Electric Trucks and EXIDE-IRONCLAD BATTERIES

1888 . . . Dependable Batteries for 60 Years . . . 1948

management data sheet 32

THE FOREMAN'S STATUS

FOREMEN, as supervisors of production, influence to a great extent both the quality and quantity of goods and services produced.

Foremen are sometimes of the opinion that they are the forgotten people of industry; many of them might be described as the confused and uninformed members of management.

This checklist is designed to explore this subject, and to indicate areas in which action to improve the situation might be taken.

I. AUTHORITY COMMENSURATE WITH RESPONSIBILITY

It is essential that each foreman have a clear realization of his duties and responsibilities and the extent to which he may exercise authority.

A. Job description. Are there current written job descriptions outlining in detail each foreman's duties and responsibilities?

B. Organization charts. Are there current organizational charts available showing the relationship and relative importance of each job in the organization to and including the foreman level?

C. Degree of Authority. Does each foreman's responsibility carry with it a corresponding degree of authority?

1. Do foremen know over which functions they may exercise full authority within the framework of company policy without consulting their superiors?
2. Do foremen know over which functions they may exercise authority but should report the action to their superiors?
3. Do foremen know over which functions they are expected to make recommendations for action which must receive their superior's approval before being put into effect?

D. Hire. Do foremen have the right of final approval of all applicants for employment whose work they supervise?

E. Discharge. Are foremen's recommendations on layoffs and discharges solicited and given consideration?

F. Discipline. Are foremen consulted prior to taking any action of a disciplinary nature which may affect their subordinates?

G. Promotion and transfers. Are foremen consulted on any decisions involving the promotion or transfer of any of their subordinates?

H. Pay increases. Are foremen given an opportunity to advise and recommend wage or salary adjustments for their subordinates?

I. Transmitting decisions. Does the foreman transmit to employees decisions in which he has participated, affecting discharges, disciplinary actions, promotions, transfers, and pay adjustments?

J. Grievance. Are foremen made the first contact for workers who have a grievance?

II. COMPENSATION

A. Salary. Are foremen, and other supervisory employees, paid on a salary basis?

B. Differential. Is a pay differential maintained so as to provide foremen with more compensation than their subordinates?

C. Job evaluation. Are the rates of pay for the various foremen's jobs in line one with another based on their relative degree of responsibility and importance to the organization as determined by an evalution plan?

D. Salary survey. Are foremen's rates kept in line with those paid in the community for comparable supervisory work?

E. Employee evaluation. Is each foreman's job performance periodically reviewed in accordance with the employee evaluation plan and appropriate action taken?

F. Overtime. Is consideration given to establishing temporary additional compensation for foremen during any prolonged periods of abnormal operations requiring a lengthened work week?

III. THREE-WAY CHANNEL OF COMMUNICATIONS

Provision should be made to bring all members of the management group in contact as often as possible for the mutual exchange of information and ideas.

A. Daily contacts. Are frequent visits made by higher levels of management to all departments, so that they are available for friendly consultation?

B. Consultative supervision.

1. Are foremen encouraged to seek the counsel and guidance of their superiors?
2. Do foremen's superiors make themselves readily available for consultation and adopt a sympathetic and fair attitude when consulted?
3. Contests and tournaments. Are casual

SOURCE: General Foods Corporation, New York

CONTINUED ON PAGE 134

4,200 HOURS' OPERATION—STILL SLUDGE-FREE

Sun Diesel Lubricating Oil Almost Good As New After Outlasting a Competitive Product 5 to 1

A prominent manufacturer uses 8-cylinder, 4-cycle diesels to generate power. Recently, at the suggestion of one of our engineers, a Sun diesel lubricating oil was tried in one of the units.

Results were impressive. Inspected after three months, the engine was found to be in the cleanest condition since installed. In tests run against competitive oils, one manufacturer's product sludged up in 600 hours. Yet the Sun oil was practically as good as new after 3,000 hours, showing but a slight increase in neutralization number. In further tests, the Sun oil ran 4,200 hours in six months' operation without a change; the engine remained clean and sludge-free, and showed no signs of wear.

On the basis of this performance, the plant has extended the use of Sun oil to other diesel units.

Here is just one example of the records being set by Sun "Job Proved" lubricants in all their wide applications. You can rely on Sun products to keep diesels, turbines, steam engines and other power equipment operating smoothly and with minimum maintenance. To get complete information call the nearest Sun Office. For Technical Bulletin "Lubrication of Diesel Engines," write Department F-8.

SUN OIL COMPANY • *Philadelphia 3, Pa.*

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SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

management data 33 sheet

THE FOREMAN'S STATUS

CONTINUED FROM PAGE 132

"get together" bowling, baseball, golf or other sport contests arranged for foremen and other members of management?

4. Foremen's dinners and other social events. Are casual dinners or other social events arranged to bring together in one group all members of the management team?
5. Foremen's meetings. Are frequent foremen's meetings conducted? Does the plant manager generally participate in such meetings? Are all plant problems of current interest open for discussion? Are departmental meetings held where the size of the plant makes larger meetings unwieldy?
6. Foremen's grievances. Are foremen encouraged to express any grievances which they may have, either orally or in writing?
7. Foremen attitude surveys. Has consideration been given to occasionally conducting foremen attitude surveys, as a means of disclosing any evidence of dissatisfaction?
8. Foremen's manuals. Does the foreman have in one document the necessary information on company policies, practices, and procedures which relate to the performance of his job?
9. Supervisory bulletins. Are foremen placed on the distribution list for all bulletins directed to the management level?
10. Union contract. Are foremen provided with a copy of the union contract? Are they given a copy of the minutes of all grievance committee meetings held and decisions rendered? Are foremen given an opportunity on a rotating basis to serve as a representative on the grievance committee? And are their suggestions solicited when a contract is up for renegotiation?

IV. RECOGNITION OF SUPERVISOR'S STATUS

All persons who in actual practice represent management in dealing with employees should be treated in such a manner that their identity as part of management will be clearly apparent throughout the company.

A. Desk or office. Are foremen provided with a desk or an office so that they may consult with their employees in a private or semi-private manner?

B. Time clock Are foremen required to punch a time clock?

C. Privileges. Are foremen given privileges accorded other members of management such as a telephone, listing in the plant directory, paid by check, separate mail boxes for their communications, and use of any reserved automobile parking space?

D. Management's announcements. Are foremen permitted to issue to the rank and file all instructions from higher management?

E. Line organization.

1. Are all instructions and information transmitted through the line organization?
2. Is the authority and prestige of foremen protected against being bypassed without their knowledge or understanding?
3. Is the proper relationship between line and service functions made clear to all concerned?

F. Policy formulation. Are foremen permitted when practical to participate in the formulation of company policies by giving them an opportunity to make suggestions before a final decision is reached?

G. Social status. Are foremen given appropriate recognition at special company celebrations, at local community affairs, and in plant publications?

H. Clerical duties. Do the foreman's clerical duties impede his supervisory function?

V. SECURITY

Foremen should be selected carefully and their positions made as secure as is consistent with the general welfare of the particular unit.

A. Selection.

1. Are advanced lists carefully prepared indicating potential candidates for vacancies in the next higher level of management?
2. Are new foremen selected not only on the basis of their qualifications for the current job, but also based on potentialities for further growth?

B. Employee evaluation Is the employee evaluation plan used as a basis for making sound and less arbitrary decisions when demotions of foremen might become necessary?

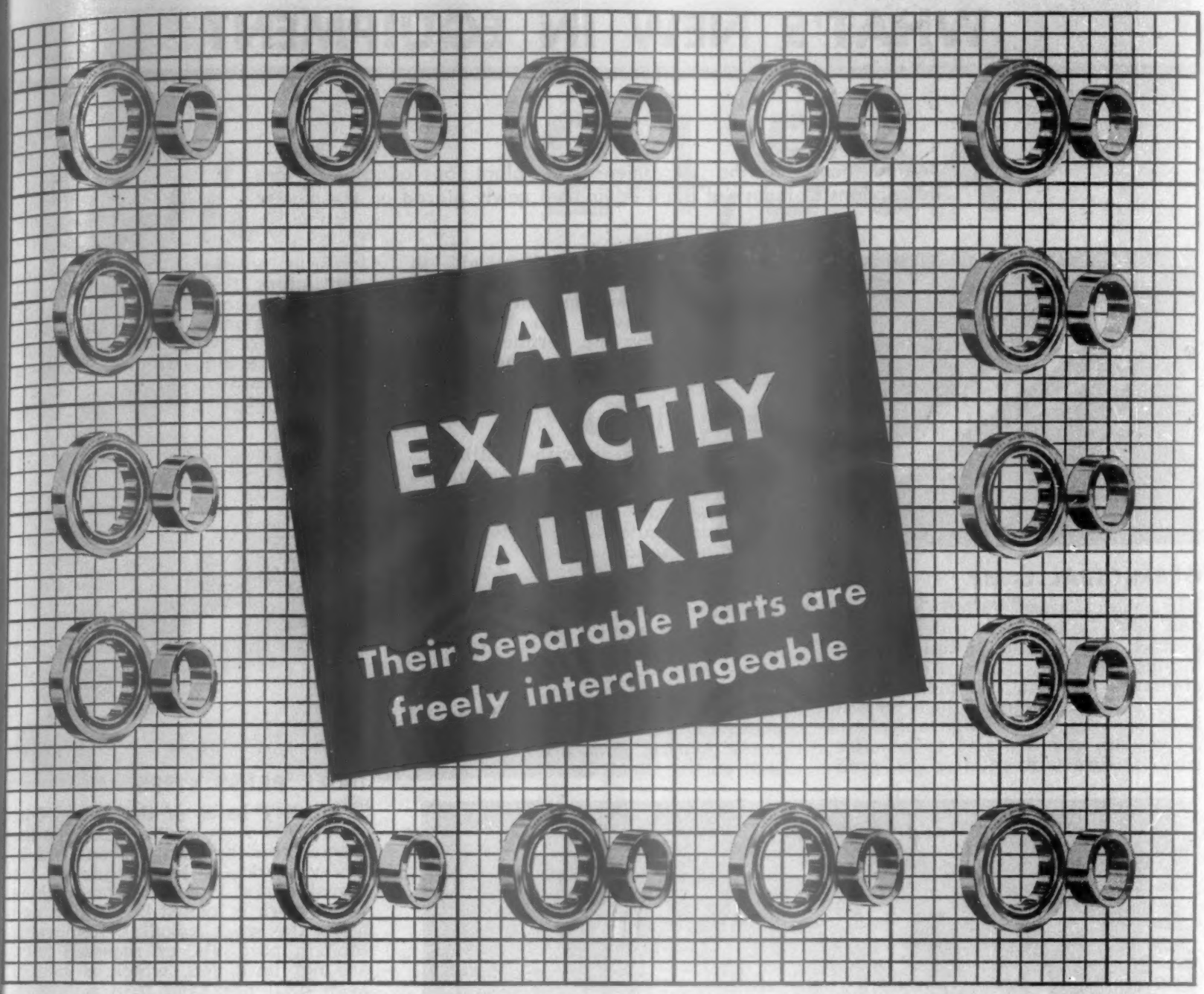
C. Training.

1. Is there a program of continuous supervisory development in operation?
2. Are foremen being prepared for promotion to the next higher management level?

D. Temporary foremen. When it is necessary to give employees temporary assignments as foremen, are they made to understand that their new status is in fact temporary?

E. Union contract seniority. Is provision made to insure that foremen, on demotion and return to the bargaining unit, will receive credit for all their years of service with the company, both as a supervisor and a production worker?

SOURCE: General Foods Corporation, New York.



Hyatt Hy-Load Roller Bearings are not only designed for high capacity and tough loads but they save much time and labor.

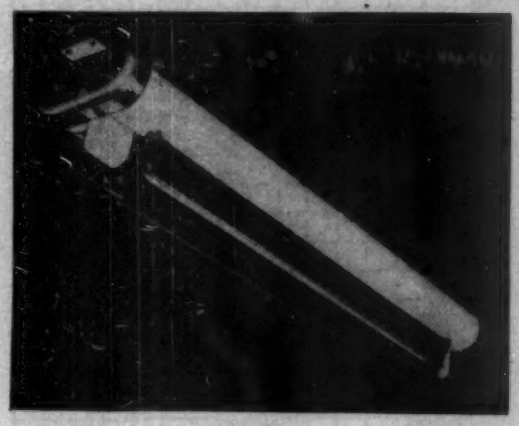
Being *mass-precision-produced*, the separable component bearing parts are freely interchangeable. On your final assembly lines, subassemblies go together without time-wasting selection or "matching" of bearings.

And because Hyatt Hy-Loads are available in 10 major types—more than 500 sizes—in two diameter series, wide and narrow widths—your design engineers can select the Hy-Load bearing best suited to your needs. Write for information. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey, Chicago, Detroit, Pittsburgh and Oakland, Calif.

HYATT ROLLER BEARINGS

WHAT'S NEW IN EQUIPMENT

Briefed here—for the convenience of plant operating men—are descriptions of industrial plant equipment newly placed on the market



GERMICIDAL LAMP

Ultra-violet units, called Nos. 2902 and 2903 Letheray, are designed to protect products susceptible to contamination from spoilage caused by air-borne bacteria and mold spores. They may be mounted flush on ceilings or over processing tables and conveyors, and are said to be effective in direct irradiation of products or the surrounding air to destroy organisms and prevent them from reaching surfaces of products. Adjustable louvers can be set to direct or baffle the germicidal rays as required. Hanovia Chemical & Mfg. Co., Newark, N. J.

METAL WINDOWS

Factory sash made with ventilators, and called Lok'd Bar, are designed for use with standard interior screening. They are complete frame and casement units with intersecting joints, are solid welded at the corners, and their weatherings are an integral part of the section, closing on wide double contact surfaces without the use of extra attached strips. They open outwardly, on heavy steel arms. Brass guides, attached to the ventilator, slide in the frame channel as the ventilator opens. A coil spring enclosed in a brass housing provides correct tension on the slide, holding the guides in true position. Inward opening ventilators for use with standard outside screening also are available. Both types may be operated either manually or with electrically controlled gearing. Hope's Windows, Inc., Jamestown, N. Y.

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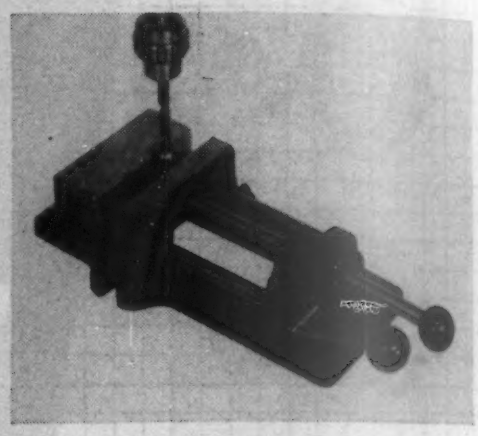

DRILL PRESS VISES

The heavy bases of the 4- and 6-in. drill press vises are said to keep the frame from buckling when used in heavy work. A long guide on the movable jaw keeps it from cocking when work is locked in position, and holds the work parallel. Removable built-in parallels, or recessed jaws, are not hardened, which is said to keep drill breakage to a minimum. The 4-in. vise has an opening of 7 inches, allows for 6⅛ inches of loading space; the 6-in. vise opens to 7⅛ inches, allows 7 inches of loading space. Trigger on the locking mechanism works on an eccentric, decreasing the size of the hole around the center bar. Hartmann Mfg. Co., Racine, Wis.

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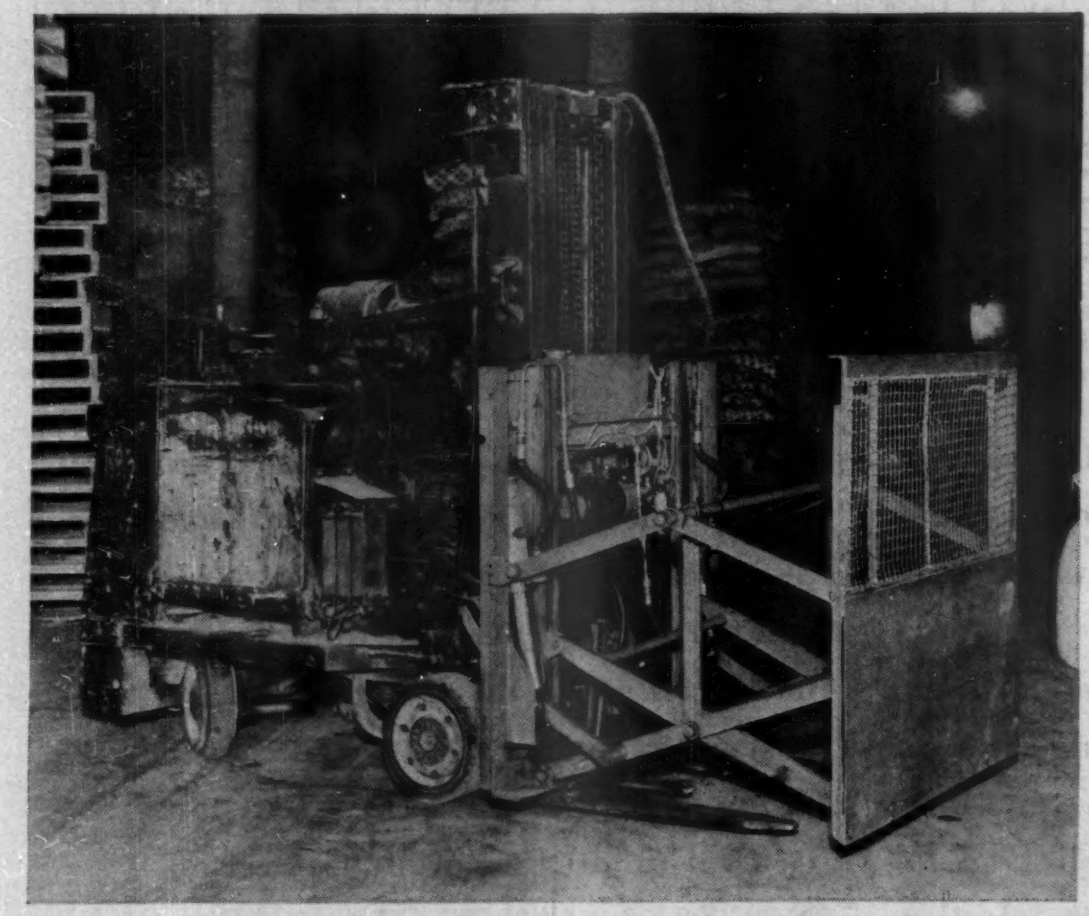
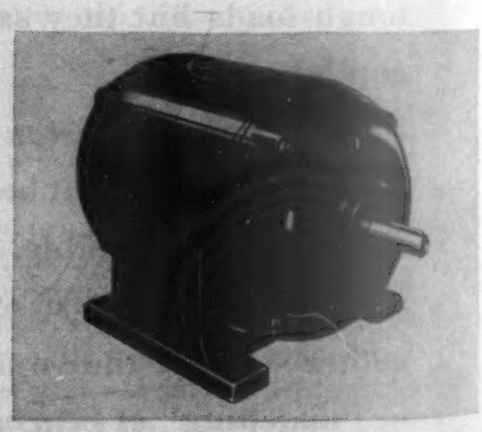


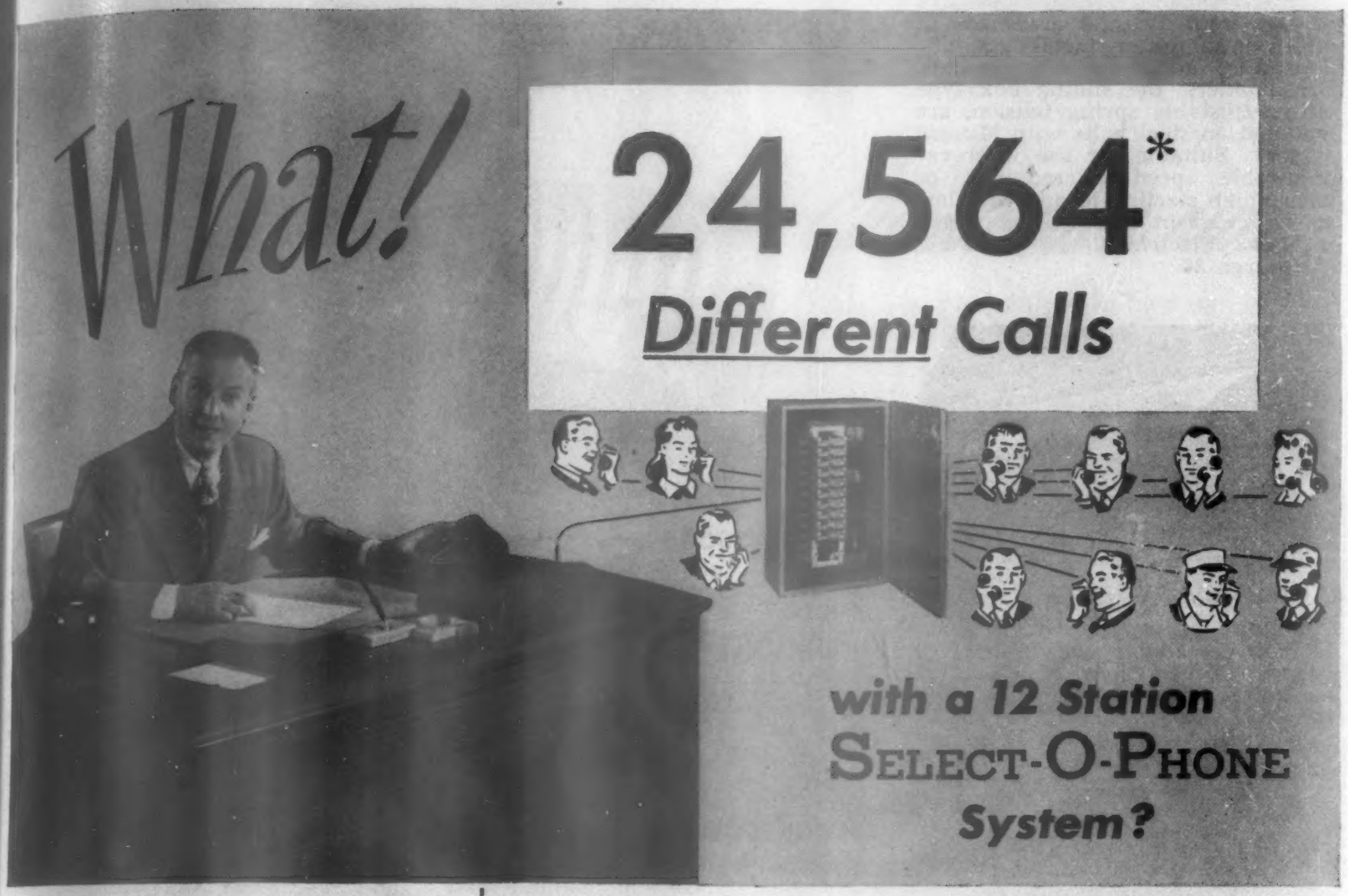
PALLET UNLOADER

Device used to unload pallets can be adapted to any make of fork truck by means of a locking mechanism which grips the pallet, while two hydraulic cylinders exert a thrust of 4000 pounds through a link system to a platen. In the retracted position, unloader occupies only 4½ inches of fork space; can be extended 42 inches in 15 seconds. Operation is controlled by an electrical switch connected to the truck battery. Features include a cushioning valve arrangement to absorb shock, because the platen retracts in 10 seconds; locking mechanism aligns itself automatically if the pallet is out of position, by sliding along a bearing rail. Unit can be installed or removed from the truck in only 30 minutes, says the manufacturer, because it is self-contained. Houser Machine Co., Fort Worth 11, Tex.

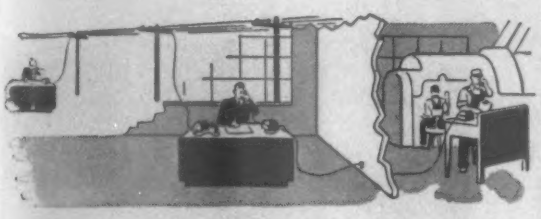


WOUND-ROTOR MOTOR

Available in ratings of from 1 to 15 horsepower, frames 203 through 326, wound-rotor induction motor, Type CWP, is of open drip-proof construction. The frame is rolled from steel plate, and the feet are of pressed steel. Pulley end bracket is of pressed steel, and front end bracket



* *Don't just take our word for it—we checked our Chief Engineer's figure with Joel Kupperman, mathematical genius of the Quiz Kids.*



How Select-O-Phone Improves Customer Service

Suppose a customer calls you for information about a particular job. You hold him on the outside line, call a plant foreman on the Select-O-Phone. In just a few seconds you have the information, and can give it to the customer without the inconvenience and delay of a call-back.

Why Select-O-Phone Will Save You Money

With a Select-O-Phone system key people spend more time at their desks. Rented equipment is kept open for outside calls, eliminating "jamming" at the switchboard. Select-O-Phone also saves money by reducing outside telephone bills, and gives better control over outside personal calls. Switching equipment will handle up to 36 stations.

Yes! any person can call anyone else or any group of other people —this is not practical with any other system

Of course, no organization would conceivably make the thousands of possible combinations of calls cited here. But, the figure is dramatic proof of this all-important advantage of the Kellogg Select-O-Phone automatic telephone system.

Every telephone is a "master station." Any one person can call any other person, or initiate a conference call with any group of people connected in the system.

Progressive executives have long recognized the advantages of owning their own internal telephone systems. And here is why thousands have chosen Select-O-Phone, the system which *pays for itself in savings* in as few as two, three or four years.

- Select-O-Phone is the only system which permits an *unlimited number* of simultaneous conversations — there can be no bottleneck in the switching equipment. If you dial a number and receive a busy signal, it can only mean that the person you want is talking — with other systems it could also mean "all trunks busy."
- Every conversation is *confidential*—and there are no loudspeaker answers for visitors in your office to overhear. ("Name-touch" executive station with loudspeaker is optional.)
- If you receive no answer to a call, a code signal on "General Call" will bring the man you want to the nearest telephone.
- Switching equipment requires no special room, operators or batteries — can be wall-mounted. No expensive wire plan is needed — both installation and maintenance costs are amazingly small.
- Select-O-Phone System is built by Kellogg — maker of quality telephone communications equipment for 50 years — your guarantee of long time, trouble-free service.

SELECT-O-PHONE DIVISION
KELLOGG SWITCHBOARD AND SUPPLY COMPANY
6650 South Cicero Avenue, Chicago 38, Illinois

Before You Buy, Get All the Facts. Mail This Coupon Today.

Select-O-Phone Division
Kellogg Switchboard and Supply Company
6650 South Cicero Avenue, Chicago 38, Illinois

Please send me full information on how the Select-O-Phone dial telephone system can save time and money for our company.

Name_____

Company_____

Address_____

City_____ State_____

of cast iron. Brushes are made of electro-graphite or metal graphite, depending on service requirements. Brushholders, the sliding box type with adjustable spring tension, are mounted on steel bolts with Micarta spacers. Suitable for use wherever adjustable speed is required, or where high starting torque with low starting current is necessary. Westinghouse Electric Corp., Box 868, Pittsburgh 30.

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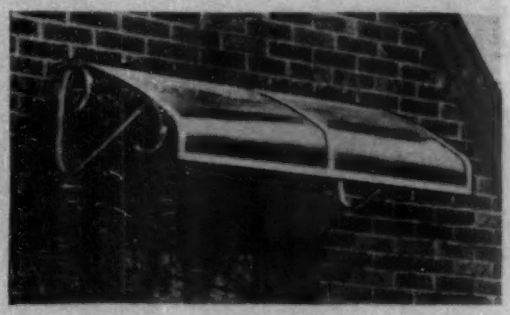

ALUMINUM AWNING

All-aluminum canopy, called Lumi-Shade, is available unpainted or in baked-on blue, green, or Dubonnet enamel. Comes custom made, or in standard stock widths of 30, 36, 42, or 63 inches, with 30- and 39-in. projection. Thabet Mfg. Co., 626-628 Huron St., Toledo 4.

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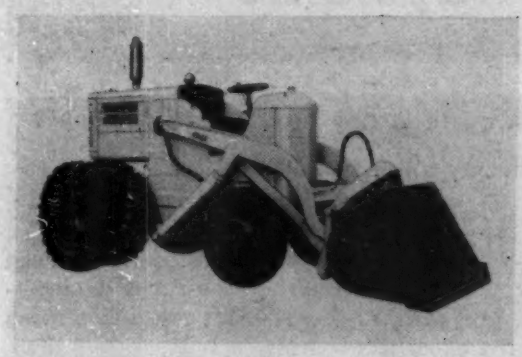

DUMP TRUCKS

Dump trucks, called Payloaders, Model HA, 10½ cubic feet, and HL, 1¼ cubic yards, now have hydraulic bucket control as standard equipment, states the maker. Bucket can be dumped gradually or abruptly, regulated by fingertip control, and can be closed immediately by the same control, allowing portions of the bucket load to be deposited in two or more places. The Frank G. Hough Co., 801-V Sunnyside Ave., Libertyville, Ill.

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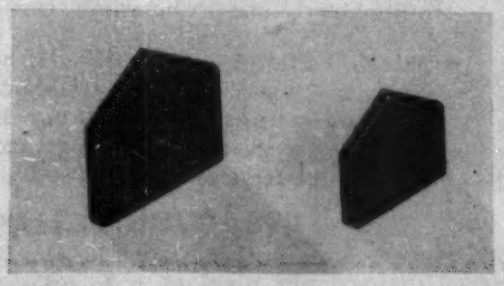
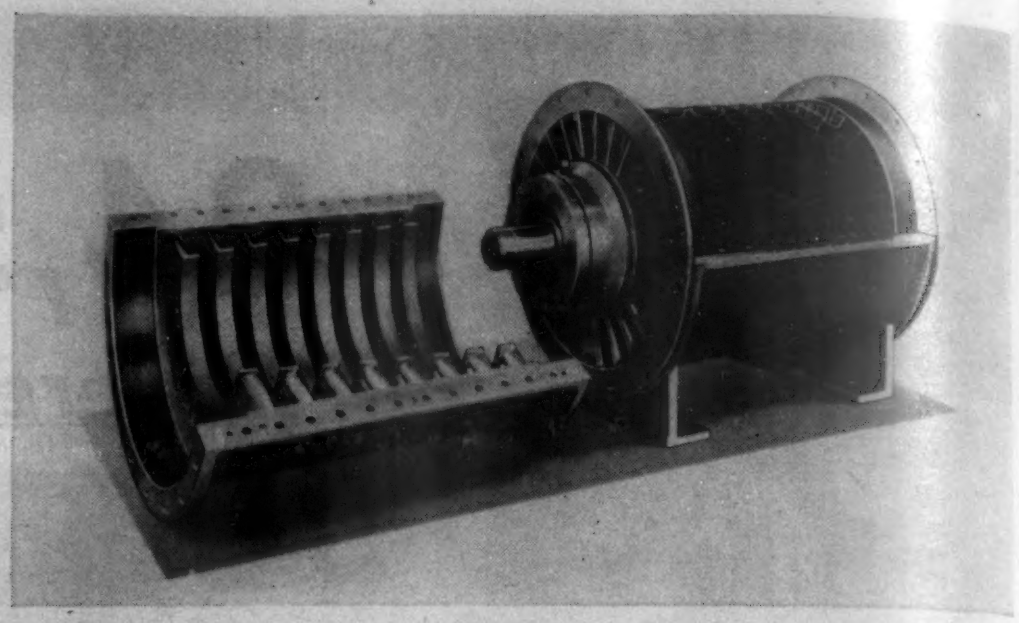


MASONRY DRILL TIPS

Line of carbide masonry drill tips, made in a full range of sizes, are for use on concrete, brick, slate, plaster, and tile in both rotary and percussion-type drills. Said to hold their edge under the most abrasive cutting conditions and to be so hard that they rarely need resharpening. Adamas Carbide Corp., 40-30 23rd St., Long Island City 1, N. Y.



COMPRESSORS

Line of axial flow compressors is said to use a new principle of design in order to save power consumption. Capacities range from 1000 to 300,000 cubic feet per minute, and pressures up to 100 p.s.i. can be obtained in a single unit. Drive may be electrical, steam, or gas turbine. Fredric Flader, Inc., 575 Division St., North Tonawanda, N. Y.

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FLUORESCENT LAMP

Slimline fluorescent lamp, 75-watt T12, is 1½ inches in diameter and 96 inches long. It is said to combine characteristics of the regular line of Slimline lamps with the efficiency of the T12-type tube used in standard 40-watt fluorescent lamps. Available in the recently introduced Warmtone color, in 3500-deg. standard white, and on request in the 4500-deg. white. Sylvania Electric Products, Inc., Salem, Mass.

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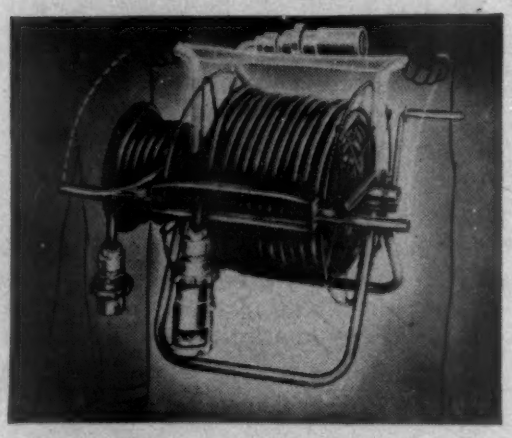

CABLE REEL

Used for transporting heavy electrical cables, portable reel, called Powereel, is designed to hold up to 300 feet of ¾-in. No. 12 4-conductor cable or equivalent. Twin handles of the combination carrier and cord guide make possible two-man carrying of heavy cable. Tubular steel supports used as sled runners facilitate passing the reel in and out of trucks. Since the runners are at right angles to the direction of rotation of the reel, it will not slip as cable is unwound. Designed for use with current of any phase, the standard reel comes with three or four collector rings of heavy beryllium copper with double copper contact brushes seated in a phenolic casting, housed in metal. Special reels and collector rings for more than four conductors may be provided upon request. An adjustable brake and lock control free rotation and eliminate overwinding; reel flanges may be adjusted to give wide-diameter winding in the case of short cable lengths. Industrial Electrical Works, Dept. 85, 1509 Chicago St., Omaha 2.

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FLOOR WAX

Anti-slip, non-flammable emulsion-type floor wax, called X-ol, contains pure carnauba wax, and is said to provide a hard, glossy, flexible surface on linoleum, asphalt tile, rubber tile, wood, and cork. Drying time is about 20 minutes, and manufacturer states that mechanical drying aids or buffing are not necessary. Turco Products, Inc., 6135 South Central Ave., Los Angeles, Calif.

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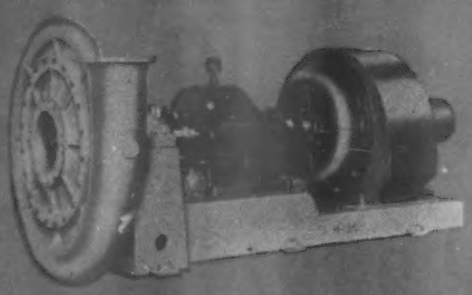
WIRE MARKERS

Self-adhesive identification labels, called Code Wire Markers, are short, narrow strips containing a selection of different code designations mounted on cards. These may be pulled off the cord, and wrapped around the wire to be marked, where they adhere without moistening. They per-

The Solvay soda process was commercially perfected in 1864. Ten years earlier, the first "Roots" Blower was produced. We're not good because we're old . . . but old because we're good.

MOVING! MIXING! MEASURING!

We give Chemicals a ride



From our standard sizes of Centrifugal and Rotary Positive Blowers, capacities are available from 5 CFM up, for separate or built-in application.

Rotary Positive Meters measure gases with cash-register accuracy, from 1,000 CFH to 1,000,000 CFH.

Most industries can profit from the experience of chemical processors in the use of Roots-Connersville equipment. Air, gas and solid particles are pushed or pulled through pipes by R-C Blowers and Vacuum Pumps. Mixtures are agitated and aerated. R-C Meters accurately measure gas input and output. Our Liquid Pumps move viscous liquids efficiently and economically.

For blowers, especially, we offer you an exclusive, important advantage. That is, our *dual-ability* to supply either Centrifugal or Rotary Positive units. Because we build both, we can recommend, without bias, the type which will do the job best. Only Roots-Connersville makes available this *dual choice.*

Our wide experience in the application of blowers and similar equipment is at your service. We help many industries to improve processes and products and to reduce costs. Consult us, without obligation.

ROOTS-CONNERSVILLE BLOWER CORPORATION

808 Central Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE

ROTARY CENTRIFUGAL

BLOWERS · EXHAUSTERS · BOOSTERS · LIQUID AND VACUUM PUMPS · METERS · INERT GAS GENERATORS

BLOWER BUILDERS R-C SINCE 1854

ONE OF THE DRESSER INDUSTRIES

mit immediate identification of wiring hook-ups, and manufacturer states that they will stay on permanently, even when pulled through a conduit. Printed in numbers 1 to 100, A to Z, in ASA and NEMA codes, and to specification. Western Lithograph Co., 600 East 2nd St., Los Angeles, Calif.

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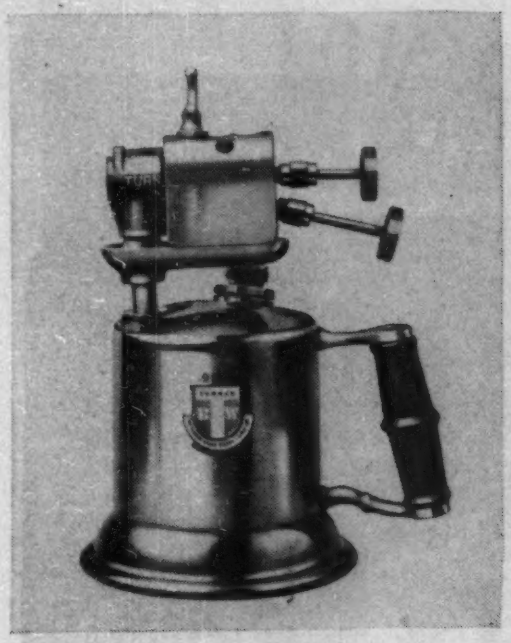

BLOW TORCH

Designed to give a pencil-point flame for use in sweating solder-type fittings, Double Jet 92-A blow torch is suitable for use on copper tubing in electrical, plumbing, heating, and refrigeration work, and other applications. The flame is said to register 2300 deg. F. by pyrometer reading. Dual valves permit selective flame control, and quick, accurate regulation. Idling flame keeps the torch ready for instant use. One-quart-capacity seamless brass tank, bottom filled. Gasoline used as fuel. Turner Brass Works, Sycamore, Ill.

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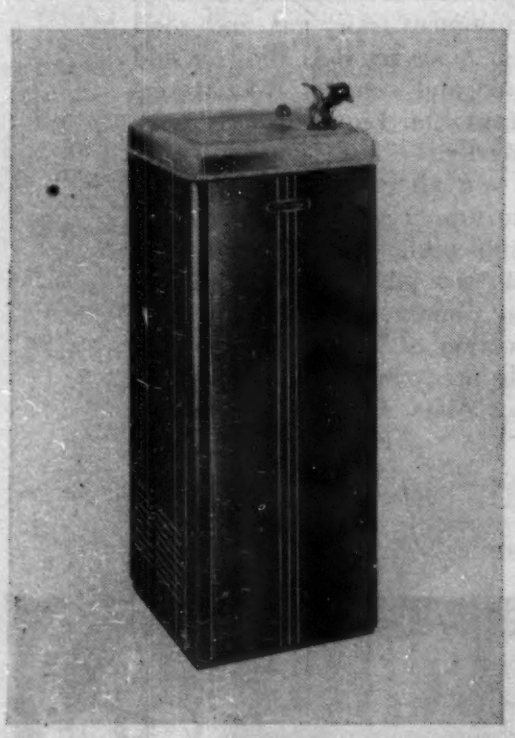

WATER COOLER

Automatic electric water cooler, known as the HCS-10W, has a water-cooled condenser. It is specifically designed for use in foundries, mills, and factories where there is an unusual amount of dirt, dust, or lint, or where the temperature or humidity is extremely high. It delivers 11.8 g.p.h. with 80-deg. F. inlet water cooled to 50 deg. F. Suitable for installations in locations with air temperatures up to 130 deg. F. Powered by 1/6-hp. hermetically sealed compressor motor unit; entire refrigeration system is sealed. External connection on the rear of the cabinet makes possible an additional remote fountain. Cordley & Hayes, 443 Fourth Ave., New York 16.

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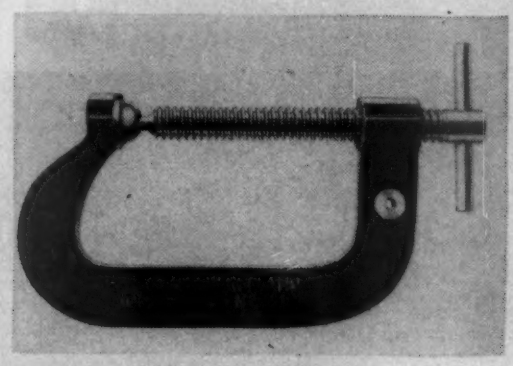

WELDERS' CLAMP

Solid alloy screw on No. 41 light-service welders' clamp resists splatter, formations of which have long been a nuisance to welders. The clamp has a forged steel heat-treated frame, and is manufactured in 2-, 4-, 6-, and 8-in. openings. The Cincinnati Tool Co., 4003 Montgomery Rd., Cincinnati 12.

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CHANGE OF OWNERSHIP

The J. W. Greer Company, of Cambridge, Mass., has announced the sale of its wire belt division. This has been acquired by the Wire Belt Company of America, formerly located in Baltimore, Md., but moving to new quarters at 750 Main St., Cambridge, Mass. Here it will continue production of wire belting, in more than 200 sizes.

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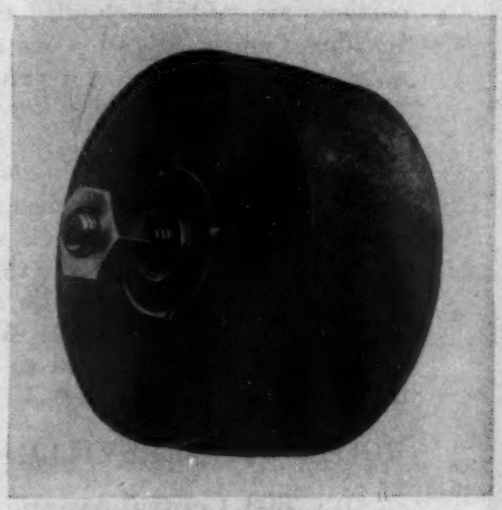

CONVEYOR ROLLER

Conveyor roller, made of neoprene sponge rubber, is designed to protect metal panel work and other production items from dents and scratches on conveyor lines. It is oil and abrasion resistant, and provides a firm support, yet is soft enough to conform to contours and absorb shocks, according to the manufacturer. Rollers are 4 inches in diameter by 2 inches wide, provided with two ball bearings, and mounted with standard ½-in. bolt and nut assembly. Wolverine Tool Co., 1494 East Woodbridge St., Detroit 7.

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GOGGLES

Head-rest safety goggles, called the Duraweld Coverglas, are designed to protect gas welders, burners, cutters, brazers, and furnace men against injurious light radiations, glare, flying sparks, and scale. They have a spring mechanism which throws the goggle into *off-guard* position by a flick of the wrist. Adjustment to facial contours and correct pupillary distances can be made without tools, and a nut turning on a right and left-hand threaded stud adjusts the fiber headgear to fit comfortably. May be worn directly over the eyes or over personal prescription glasses. American Optical Co., Southbridge, Mass.

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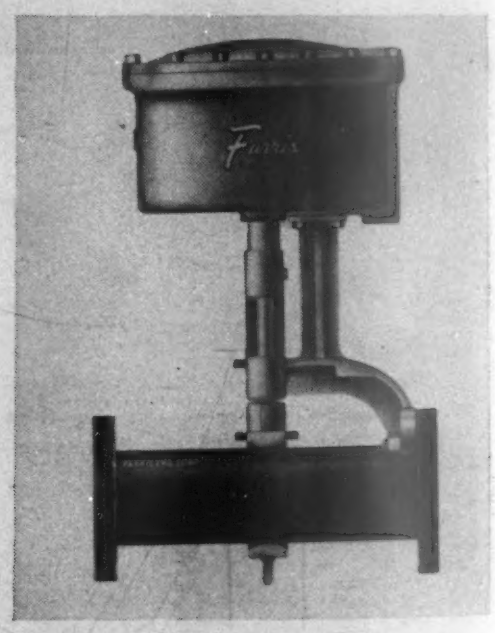


PINCH VALVE

Automatic controls for use with a new type of pinch valve utilize a springless "Dual Drive" operating mechanism. This mechanism is piston operated, with dual opposing pistons. It is self-guiding and has heavy bearings on each sleeve, both inside and out. Special *0* rings eliminate air or water leakage, and no packing glands are employed. Heavy cast-aluminum case houses the non-copper bearing parts in the mechanism. Loading force is maintained

Rock Crusher Drive Proves the Durability of *Texrope Super-7* V-belts!

Load! Shock! Grit! All these demons that destroy V-belts are present in this powerful rock crusher drive. But *Texrope Super-7* V-belts are giving long, satisfactory service, even under conditions like this. For big drive or fractional hp—for every type of service—get these famous V-belts from your nearby A-C dealer or office.

"PRE-ENGINEERED" TEXROPE DRIVES

You can solve 90% of all V-belt drive problems, from 1 to 150 hp with economical stock *Texrope* V-belts and sheaves. New 144-page manual makes drive selection as easy as finding a number in a phone book. Ask for Bulletin 20B6956. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

Texrope, Super-7, Texsteel, Texdrive, Magic-Grip and Vari-Pitch are Allis-Chalmers trademarks

A Complete Range of Products

5 types . . . sizes to suit every power transmission job	
Sheaves in a full range of sizes and grooves	
Exact variations in speed — Stationary or Motion control	
Speed variations up to 375% at the turn of a crank	

A 2429A

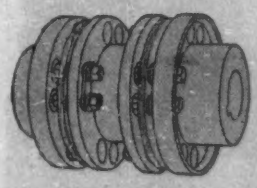
Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.

ALLIS-CHALMERS

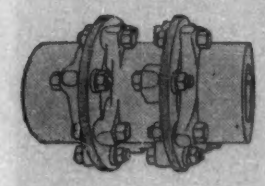
Originators of the Multiple V-belt Drive for Industry

THOMAS Flexible ALL METAL COUPLINGS

Engineered to stand up on the toughest jobs, Thomas Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

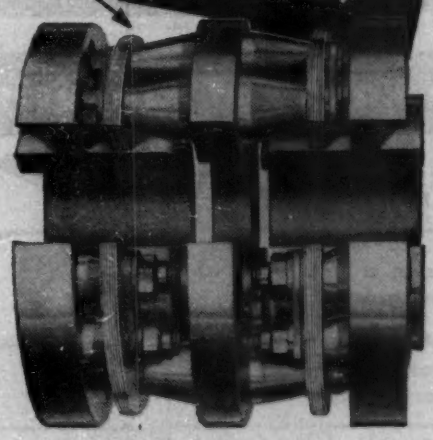


The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special couplings.



BACKLASH FRICTION WEAR and CROSS-PULL are eliminated NO LUBRICATION REQUIRED!

PATENTED FLEXIBLE DISCS



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

Write for New Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

throughout the entire stroke, according to manufacturer. Remote operation of the unit may be obtained, both for off-on control, and, in the case of a basic instrument type, for non-precise throttling. Farris Engineering Corp., 68 Commercial Ave., Palisades Park, N. J.

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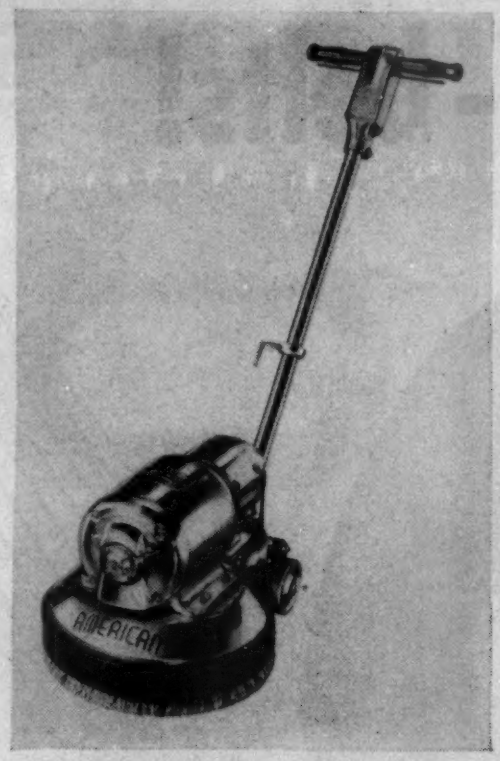

FLOOR MACHINE

Available with 13-, 15-, and 17-in. brush spread, floor maintenance machine has a "Safety Grip" handle which can be controlled with either or both hands. Each handle incorporates a switch providing off-on action when gripped, which prevents machine from starting accidentally, and stops it automatically if operator loses control. Maker states that it will handle any floor maintenance operation, including disk sanding, polishing, buffing, and steel wooling. A wide variety of brushes and discs are interchangeable. American Floor Surfacing Machine Co., Toledo.

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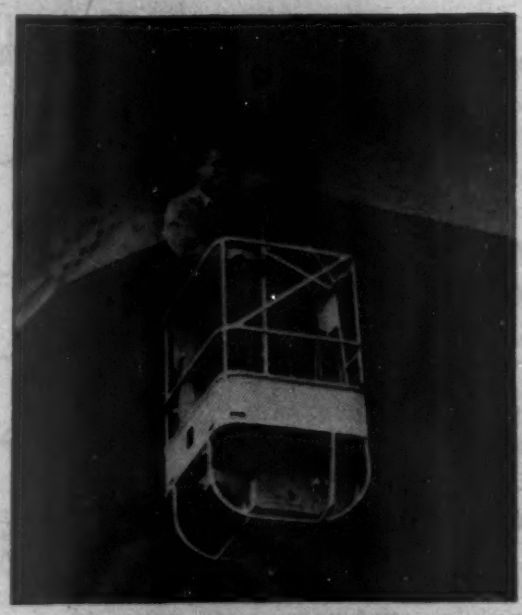

POWER-DRIVEN STAGING

Lightweight power-driven staging unit was designed for use on high work where rigging by conventional methods is expensive and difficult to accomplish. Constructed of aluminum alloy, with a double guard rail completely surrounding the operator. In use, the stage is suspended on flexible wire rope which winds on a power-driven drum beneath the platform of the unit. Power unit consists of a totally enclosed 172-to-1 reduction gear driven by a 1/3-hp. capacitor-type electric motor. Operator controls the stage by means of a three-button reversing switch, and can ascend or descend vertical drops of up to 650 feet, at an average speed of 18 f.p.m. Safety features include three independent automatic braking systems, any one of which will prevent the stage from falling. Weight of the unit, including 125 feet of wire rope, is 170 pounds. Spider Staging, Inc., Renton, Wash.

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FIRE EXTINGUISHERS

Line of 2½-gal. silicon bronze fire extinguishers consists of soda-acid, foam, plain water, and anti-freeze water types. Features include resistance welded seams; welded hemispherical domes, tops, and bottoms; silver-soldered elbow pads; projection welded hanger loop; wide bottom handle; interchangeable caps, collars, and gaskets; spotwelded name plates with identifying colors for each type of unit; transparent plastic nozzle providing vision of passageway and resistance to accidental blows. American-LaFrance-Foamite Corp., Elmira, N. Y.

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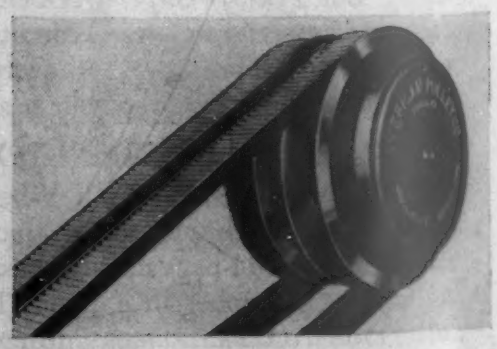


ADJUSTABLE DRIVE SHEAVE

Wide-range, adjustable-diameter drive sheave has a rubber-lagged hub upon which the sheave flanges are mounted. Bonded to the steel hub of the sheave, the rubber section is said to eliminate freezing by acting as an insulating cushion between the flanges and the hub. It also acts

PULL

Gilmer KABLE KORD FLAT ENDLESS BELTS

The famous "two belts in one"

Power and contactor combination in one belt! That's the double-duty service Gilmer Kable Kord provides on every flat belt application. Exceptional grip is built right into the belt . . . by pressure of top row cords which squeeze lower power section firmly against pulleys as the drive operates. Endless cords hold stretch to a minimum—on some installations after two or three years practically NO take-up has been required.

Available also in running lengths in popular weights and widths.

In general flat drive service, where economy is the first consideration, Gilmer Standard Cut Edge Belting—for use with connectors—offers dependable power transmission under most operating conditions. Constructed of rubber-fabric, Gilmer Cut Edge Belting features sealed edges for protection against fraying.

Gilmer Kable Kord and Standard Cut Edge Belting meet every flat belt operating standard . . . with a generous margin of extra service. On *your* power drives they give extra pull, reliable power and longer belt life.

L. H. GILMER COMPANY
Tacony, Philadelphia 35, Pa.
Division of United States Rubber Company

Gilmer Kable Kord easily absorbs shocks on heavy drives such as in lumber mills.

Gilmer BELTS

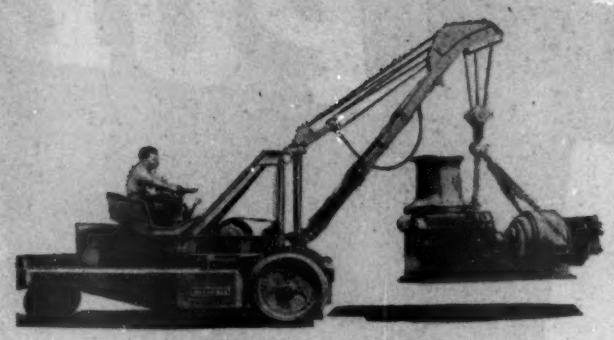
BUY THROUGH YOUR GILMER DISTRIBUTOR

THERE IS A GILMER POWER TRANSMISSION BELT FOR EVERY NEED and HOSE AND PACKING for ALL SERVICES

MATERIALS HANDLING EQUIPMENT

CUTS OPERATING COSTS ... SPEEDS OUTPUT

KRANE KAR performance is unmatched. Works anywhere—in the plant or yard—tight quarters, low headroom, long hauls, up and down grades. Makes short work of Loading and Unloading freight cars, trucks, trailers . . . Transporting, Stacking, Storing . . . Plant Maintenance and Repairs. Ideal for handling steel stock (or scrap when equipped with magnet), and heavy objects like hammer heads, transmission cases, crank cases, motors, etc. Users report labor-savings up to 75% . . . materials handling costs cut to 8c a ton . . . and elimination of hazard of serious injuries commonly experienced in hand methods.*



***KRANE KAR** handles loads at Sides as well as at Front*

Gasoline or Diesel. Equipped with pneumatic or solid rubber tires; 9 to 37 ft. booms or adjustable telescopic booms; electric magnet, clamshell bucket, and other accessories available.

Users: General Motors; Todd Shipyards; General Electric; Bethlehem Steel; Boeing; Pullman Standard; duPont; U. S. Rubber, etc.

Ask for illustrated Bulletin No. 79

** Case studies on request*

THE ORIGINAL SWING-BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

1¼, 2½, 5, AND 10 TON CAPACITIES

KRANE KAR

TRADE MARK REGISTERED

SILENT HOIST & CRANE CO., 855 63rd ST., BKLYN 20, N.Y.

This *OASIS* Electric Water Cooler defies lint, dust, heat, acid fumes, or high humidity!

Provides efficient thirst-relief where other coolers fail

Employees in your industry have extra need for *properly cooled* drinking water. Plenty of fresh, *cool* water helps them do better work more easily because it makes them feel better. OASIS Model OP-10-W is built for the special needs of mills and foundries to give years of trouble-free service. Its stainless steel top and rustproofed, multiple-coated cabinet are heavily insulated. Equipped with a water-cooled condenser, the OP-10-W delivers full capacity in high temperature locations. Available with EBCO's famous, smooth-working dial-action bubbler for spurtless drinking ease. Write for complete information. Mail the coupon today!

OASIS ELECTRIC WATER COOLERS

The EBCO Manufacturing Co.
401 W. Town St., Columbus 8, Ohio

Please rush details on OASIS Model OP-10-W

NAME _____ TITLE _____

FIRM _____

STREET _____

CITY _____ ZONE _____ STATE _____

to eliminate noise, pounding, and vibration. Adjusting mechanism provides a means of shifting all flanges simultaneously. A single locking screw prevents flange movement while in operation. The American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29.

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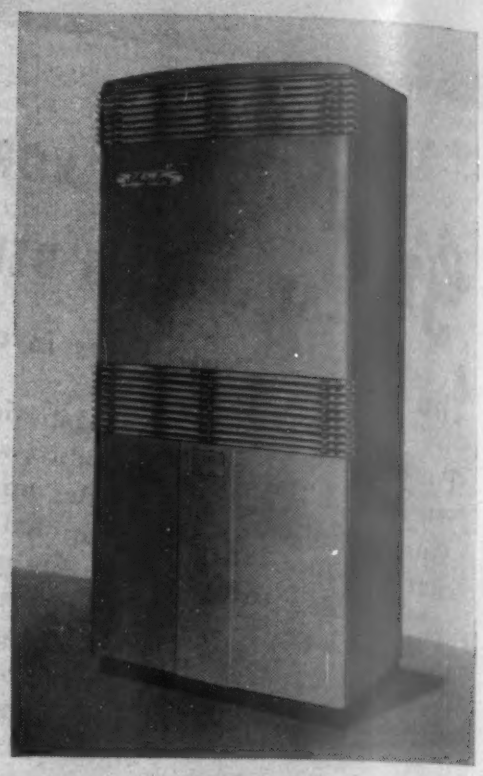

AIR CONDITIONERS

Packaged air conditioners, in 3-, 5-, and 7½-hp. sizes, are powered by two-stage hermetically sealed compressors. They require only three plumbing outlets and one electrical connection. Units are comparatively light in weight, ranging from 884 to 950 pounds, and are enclosed in steel cabinets. York-Shipley, Inc., York, Pa.

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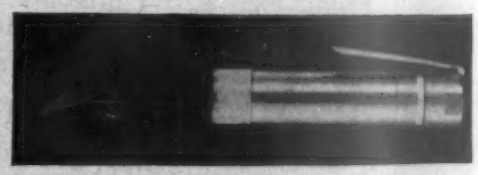

SCALING HAMMER

Suitable for weld flux scaling, spatter removal, paint scaling, and rust removal, pneumatic scaling hammer has a lever throttle so that the tool can be held and operated in one hand. Throttle is designed so that light pressure on the lever meters sufficient air for light work, heavier pressure gives full power. Other features include exhaust air for cleaning away chips and scale, removable chisel retainer, and wafer valve of stainless steel. The Rotor Tool Co., 17325 Euclid Ave., Cleveland 12.

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FUEL OIL ATOMIZER

Mechanical fuel oil atomizer, designed to eliminate the necessity for changing sprayer plates, has a capacity range of 10 to 1 without returning or recirculating oil which is delivered to the atomizer at 300 p.s.i. Manufacturer states that use of the atomizer minimizes cleaning of sprayer plates, and reduces carbon-

SERVING YOU by doing things with air

CUTTING TOOL—for the Finishing Department

This DeVilbiss spray gun is the "cutting tool" that cuts painting costs. It is famous for quality, speed and efficiency in coating, painting and finishing operations throughout all industry.

Mounting product finishing costs that plague production and curtail sales decline when you put a DeVilbiss spray system to work. DeVilbiss equipment conserves valuable manhours . . . reduces material waste . . . knocks the bottom out of finishing costs. And DeVilbiss systems also give added beauty and durability to finished products.

Consult your DeVilbiss engineer for an efficiency check-up of your present methods. He'll gladly extend a helping hand so that you too can finish products better . . . faster and for less.

THE DEVILBISS COMPANY, TOLEDO 1, OHIO

Canadian Plant: WINDSOR, ONTARIO

DE VILBISS *means* **Quality** *in all four . .*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

UNIVERSAL PRODUCTS Simplified Control of Auto-Parts Production, Costs and Tools thru McCASKEY

Twenty-one years ago the Universal Products Corp., Dearborn, Mich., adopted McCaskey Control of production, assembly, costs and tools for the manufacture of many varieties and sizes of universal joints and drive shafts. The simplified procedures that cut unnecessary operations then and gave them prompt, accurate control are equally effective today.

Duplicate time tickets and a few other essential forms provide data for complete control at one-writing. Repeated postings of the same information have been eliminated. One copy is quickly filed on the Planning Boards shown above, providing a visible record of progress or work-in-process by production order numbers, parts and operations.

The other copy gives the Accounting Department identical data for cost records. There are no delays. Both are immediately available at the end of operations or shifts.

McCaskey Control in the tool cribs has stopped the disapearance of tools, loss of time by employees at the crib and idle time of their machines, tool breakage and excessive inventories, and has brought numerous other real savings.

Write for a demonstration of this "McCaskey Simplification" and suggestions for applications to your particular needs—or send for descriptive folders. No obligation, of course.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

ization of tips. Suitable for use with air registers on steam generat rs, with gas turbines, and other applications. The Engineer Co., 75 West Street, New York 6.

•

TRUCK FOR CARBOYS

Truck, equipped with gripping yoke, is designed to handle dangerous chemicals or other liquids. When placed in position beside the carboy, a gripping yoke is dropped over the top, curved handles are then pulled back, which loads the carboy automatically. Steel studs on the truck frame hold the load in place. To unload, truck is tipped forward, and gripping yoke released. All-steel welded construction; over-all width, 20 inches; length, 48 inches; capacity, 500 pounds; weight, 75 pounds. Two 8x2-in. roller-bearing wheels, with rubber, pneumatic, or metal tires, are available. Palmer-Shile Co., 16007 Fullerton Ave., Detroit 27.

FLOODLIGHTS

Two general purpose floodlights, Type L-82, rated at 300/500 watts, and L-83, 750/1000 watts, are designed for small-area lighting. Hinged door, locked by three clamping lugs, is tightly sealed. Aluminum reflector and a locking handle on the elevation adjustment are standard equipment. Both types can be provided with portable base as well as slip-fitter and pipe-clamp mountings. General Electric Co., Schenectady.

•

FLOOR TILE

Known as Permalite, plastic asbestos floor tile comes in bright colors and is said to be unaffected by grease and oil, alkaline moisture, mild acid solutions, and to resist fire. It will conform to uneven floor surfaces, will absorb the normal play of wood floors, and can be laid over any type of base. Johns-Manville, 22 East 40th St., New York 16.

•

SPRAY BOOTH KIT

For use wherever flammable paints and varnishes are used, spray booth kit consists of an assortment of non-sparking tools, suitable for cleaning

or making repairs. Includes claw hammer, long blade scraper, deck scraper, spray booth scraper, screwdriver, and chisel, all made of Ampco metal or beryllium-copper. Packed in wooden chest with hasp for fastening. Ampco Metal, Inc., 1745 South 38th St., Milwaukee 4.

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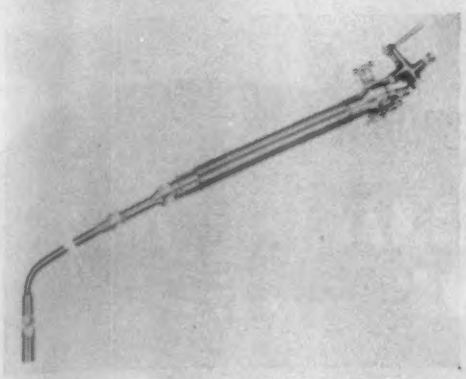


TORCH

Three-hose torch, in Models 160 and 160-G, uses two tanks of acetylene and one of oxygen. It is suitable for use in welding, heating, or brazing broken parts on heavy machinery, expanding tie rods, for heavy press installations, for bending large diameter pipes, and other maintenance work. Two-valve control for using propane, natural, or manufactured gas and oxygen for heating purposes is also available. Torch has a brass handle and monel tip-tube. Over-all length is 51 inches; weight, 6 pounds 12 ounces. Can be furnished for welding or with multiple-flame tips for heating. Weldit, Inc., 990 Oakman Blvd., Detroit 6.

•

CHANGE IN OWNERSHIP

Rockwell Manufacturing Company, Pittsburgh, has announced the purchase of Red Star Products, Inc., Norwalk, Ohio. Red Star makes a line of radial arm saws marketed under the trade name "Multiplex." All sales, distribution, and advertising of these saws will be handled by the Delta division of Rockwell Manufacturing Company, Milwaukee.

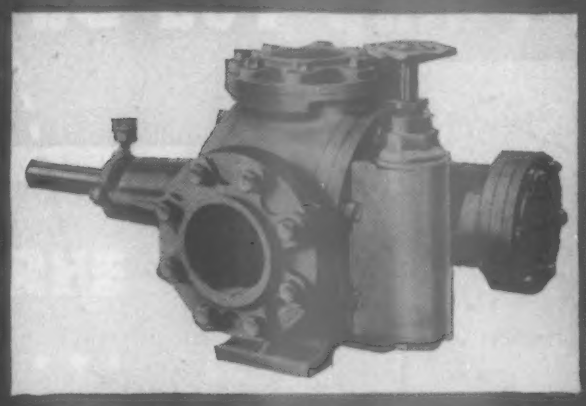
•

MOBILE CRANE

Seven-ton lift-and-carry unit, Model EC-7 Tournacrane, lifts its rated capacity, according to the maker, without the use of outriggers and counterweights. It is electrically operated and pushbutton controlled by one man. Optional accessories include detachable lift forks and rams, motorized tag line for use in operations over particularly rough terrain, multiple disk air brakes for the crane trailer, and a cab to protect the op-

ANOTHER BIG NAME IN INDUSTRY

PITTSBURGH PLATE GLASS COMPANY



PICKS THIS PUMP

AS SHOWN HERE

and for the same reason that so many manufacturers select Yale & Towne TRI-ROTOR

TRADE YALE MARK

Wire or mail your requirements to Pump Department,
THE YALE & TOWNE MFG. CO., 212 Henry St., Stamford, Conn., U. S. A.
The Yale & Towne TRI-ROTOR Pump is now in use pumping such products as these (check applications which interest you)

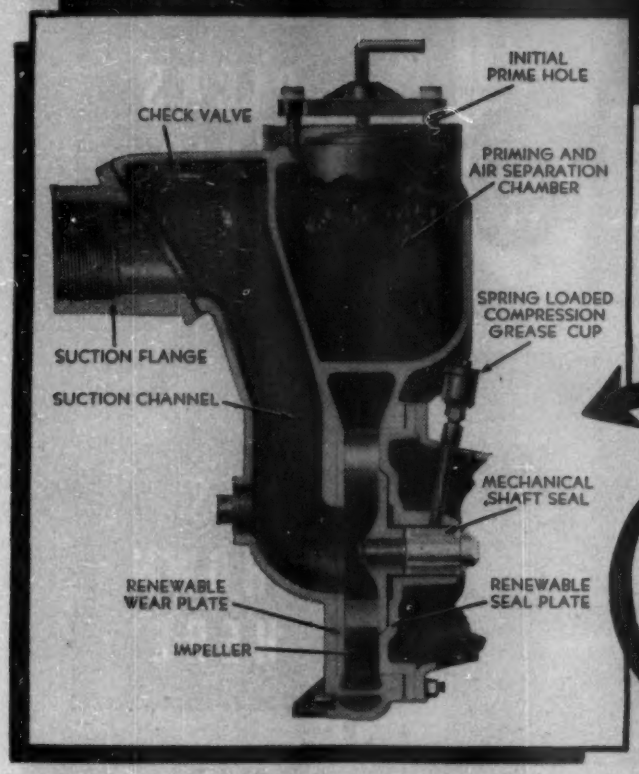
☐ Alcohol	☐ Fish Oil	☐ Lacquer	☐ Shortening
☐ Caustics	☐ Gasoline	☐ Liquid Soap	☐ Silicate of Soda
☐ Chocolate	☐ Glucose	☐ Molasses	☐ Solvents
☐ Coolants	☐ Greases	☐ Oils	☐ Starch
☐ Corn Syrup	☐ Ink	☐ Paint	☐ Varnish
☐ Edible Oils	☐ Honey	☐ Propane	☐ Viscose

NAME.....

COMPANY.....

CITY..... Zone..... State

Look into the Industrial Pump You Buy



See Why

GORMAN-RUPP LEADS THE FIELD

Here is why the NEW GORMAN-RUPP INDUSTRIAL PUMPS enable industry to more fully benefit from the advantages of self-priming centrifugal pumps.

GORMAN-RUPP'S IMPROVED DESIGN brings self-priming to its highest stage of development — no valves, no vents, no mechanical devices — no foot valve as in conventional centrifugal pumps.

ENGINEERED TO MEET INDUSTRIAL DEMANDS. These new industrial pumps reduce installation costs necessary for expensive flooded suctions for conventional centrifugals. They automatically renew their prime — handling vapor, fluids, and fluids of a gaseous nature. Abrasive solutions cause no trouble.

FURNISHED IN A WIDE VARIETY OF MODELS AND DRIVES. Capacities from 50 to 1200 GPM. The New Bulletin 8-IP-11 shows clearly why Gorman-Rupp Industrial Pumps are superior for your job.

STARTLING NEW PRIMING RESULTS

Here's the Inside Story

PRIMING ACTION — Note how the air and water leave the impeller periphery at the cut-water point and then pass into the priming chamber where the water again flows downward to re-enter the impeller periphery, mixing with air, discharging upward and separating.

PUMPING ACTION — The priming cycle has been completed. Note (see arrows) that the water is flowing upward through both volute channels and out through the discharge. Unlike other pumps — no valve required to stop recirculation.

THE GORMAN-RUPP PUMPS — GORMAN-RUPP COMPANY

MANSFIELD, OHIO

erator in inclement weather. Tournalayer Div., R. G. LeTourneau, Inc., Longview, Texas.

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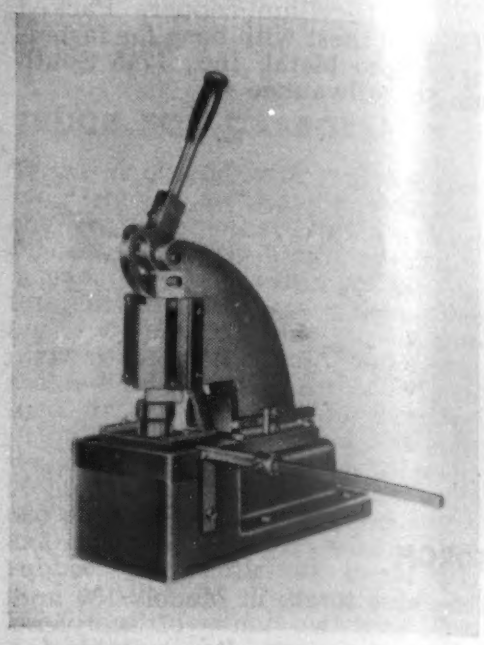

PUNCH

Two-purpose punch, called Di-Acro, is used for perforating holes of various shapes and sizes up to 4 inches in diameter, and as a precision punch press for blanking, drawing, embossing, and forming operations. Action of the machine is obtained through a roller-bearing cam, and triangular shape of hardened ram assures alignment of the punch head. Interchangeable punches in round, square, oval, and rectangular shapes available. O'Neil-Irwin Mfg. Co., Lake City, Minn.

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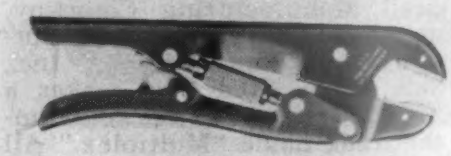


PLIERS

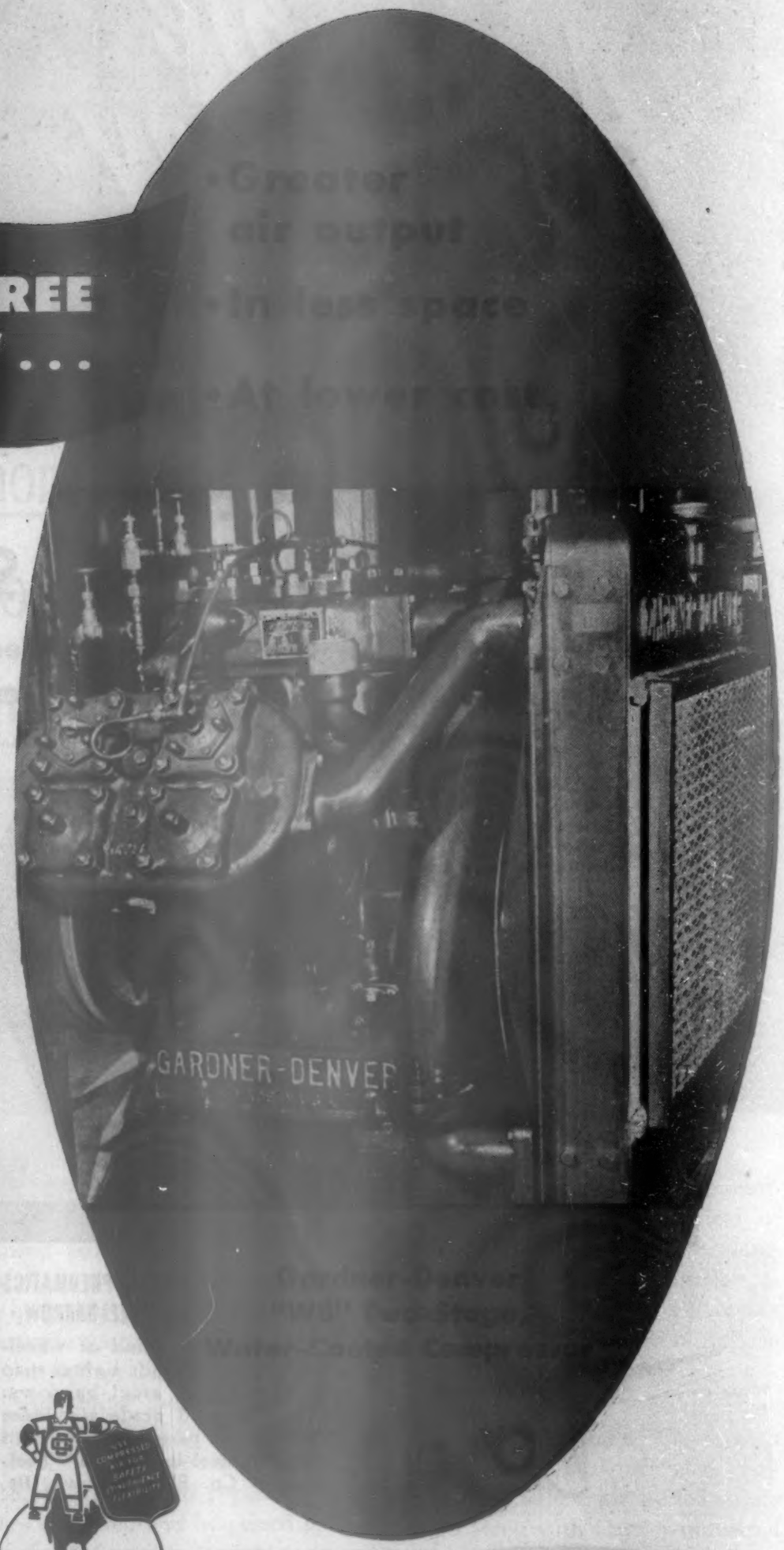
Pliers, called Gripso, are said to be adjustable for ratchet or vise plier action, to lock and release with the use of one hand only. Manufacturer states that they are adaptable for use as a nut wrench, pipe wrench, or clamp in hard-to-get-at places. Flat upper and curved lower jaw resist side twist. Adjusting screw employing both right- and left-hand thread is said to cut adjusting time considerably. H. R. Basford Co., San Francisco.

•

HYDRAULIC VISE

Using air pressure as a clamping force, Air-Hydraulic vise, DVH-150, is said to develop a clamping effort of 150 times the operating air line pressure, up to a maximum of 125

You get ALL THREE with a "WB" . . .



Gardner-Denver "WB" Vertical Compressors have the compactness you need for installation in limited space . . . yet because of their special design, these compressors have high efficiencies. Air output is much greater than that obtained with single-stage compressors of equivalent piston displacement. All cylinders are completely water-jacketed, assuring reliable operation in any temperature and at any altitude. Other valuable "WB" features are:

- *Combination radiator and air-cooled intercooler permits use where cooling water is scarce or of poor quality.*
- *Completely water-jacketed cylinders for maximum operating efficiency in any temperature or at any altitude.*
- *Duo-Plate cushioned air valves—simple, durable, unusually quiet.*
- *Timken tapered roller main bearings.*
- *Crankcase of GarDurloy alloy—completely enclosed, dust tight, oil tight.*

For complete information, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER
SINCE 1859

Available Today

FINEST RUST RESISTANT ALUMINUM ALLOY WHEELBARROW WHEELS

Separately or in Complete Assemblies with General Industrial Pneumatic Tires

Particularly effective for travel over rough or soft surfaces. Tire and tube mountable and demountable in minutes.

Wheel of rust resistant aluminum alloy.

Oil-less bronze bearing won't rust.

Non-skid tread for slippery surfaces.

Won't cut or track lawn. Excellent for all types of contracting and gardening.

GENERAL INDUSTRIAL PNEUMATICS ON NEW BUCH WHEELBARROW

Here is a new kind of wheelbarrow; 20 pounds lighter than conventional steel-barrows. Made of hard grade aluminum with wood parts of select hard oak; all steel legs. Buch Wheelbarrow Co. Elizabethtown, Pa.

THE GENERAL TIRE & RUBBER COMPANY
Dept. 9, Akron, Ohio

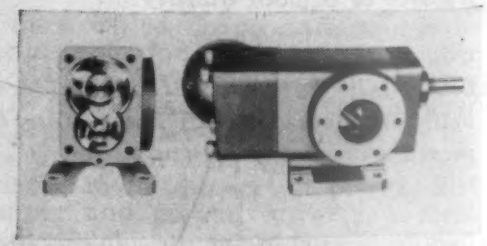
The GENERAL TIRE

INDUSTRIAL PNEUMATIC
TIRE • TUBE • WHEEL UNITS

pounds air pressure. Opening of the jaws is adjustable from a fraction of an inch to a maximum of 5 inches in increments of 1/32 inch. Has 6-in.-wide hardened steel jaws as well as soft steel false jaws. Power is obtained from an air motor in combination with built-in hydraulic intensifier unit. Available with mechanically operated valve for hand operation, for mechanical synchronization to machine movement, or with low voltage solenoid valve for electrical operation. The Bellows Co., Akron.

SKID LOADER

Motorized unit built to handle live and semi-live skids has full driving traction when lifting heavy loads, maneuverability similar to that of a hand lift jack, and capacity to handle skid loads of any size, according to manufacturer. Unit is built around the chassis and driving unit used on maker's motorized platform and pallet trucks. Trailing wheels and lifting arm are mounted on a rear-end frame, and both are built to the specifications of the skids to be handled. Truck is equipped with a foot pump used to lift the loads into moving position. Automatic Transportation Co., Chicago.

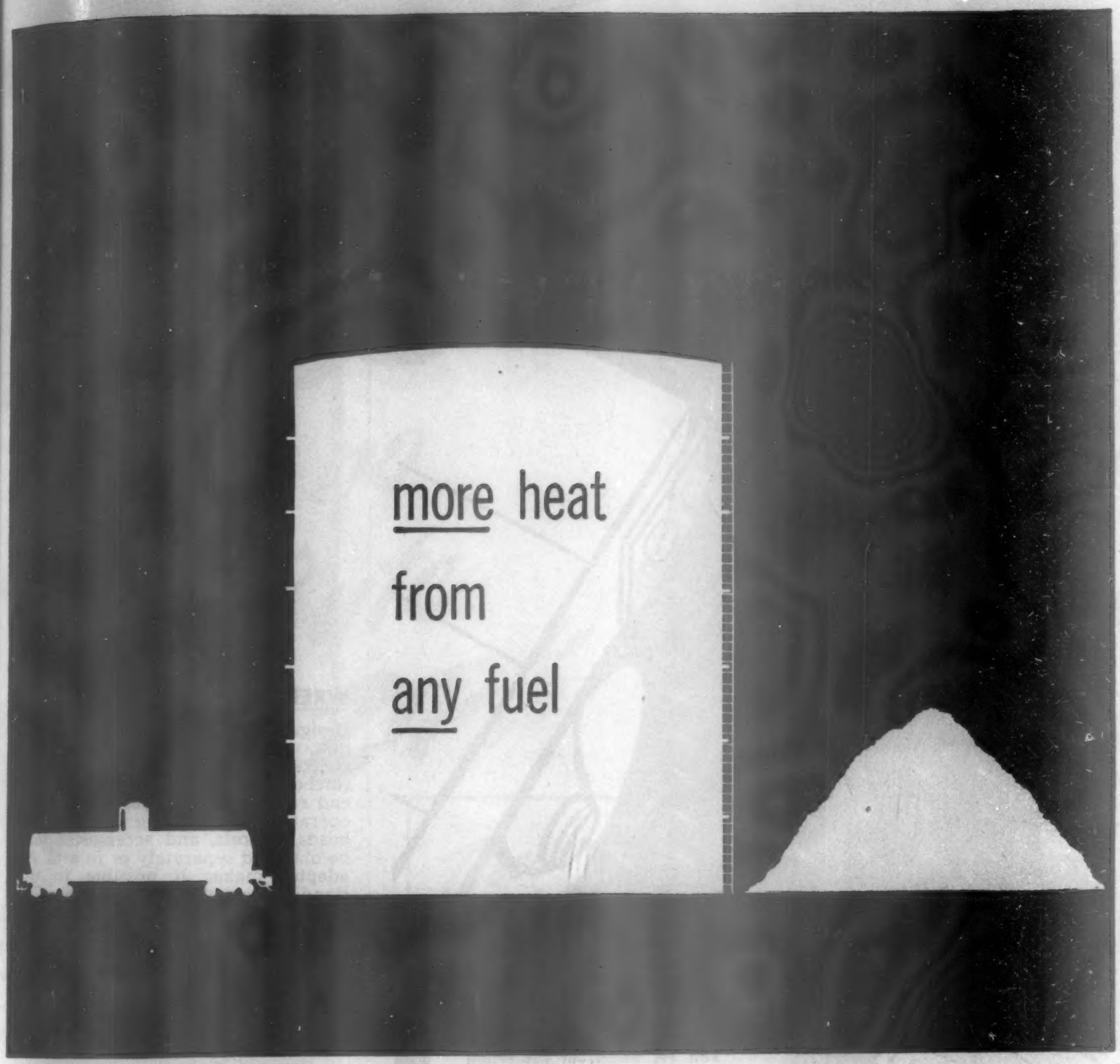


ROTOR PUMPS

Line of positive displacement, helical rotor pumps is made in two sizes, for handling various grades of oils at either 50 or 75 g.p.m. at pressures up to 125 p.s.i. Two helical rotors, one a driving rotor, the other an idler, force the liquid ahead in an axial flow in volume and at pressure. Shaft of the driving rotor is mechanically sealed against leakage, states maker. Syntron Co., Homer City, Pa.

DEODORANT

Working on the principle of surface adsorption, deodorant, called Odorid, attracts the particles that produce



Want to be sure of abundant, low-cost heat in mill, factory, warehouse or other industrial or commercial buildings? The answer is Carrier Heat Diffusers.

The scientific design of these heavy-duty standard units assures maximum heating economy. Wide uniform coverage is easy with the relatively high velocities of Carrier diffusers. Their adaptability to either low or high pressure steam or forced-circulation hot water systems has made them the choice of the largest industries.

With dynamically balanced centrifugal-type fans, belt-driven through vari-speed pulleys, a wide range of speeds and capacities is provided. Even heat distribution with efficient temperature control (manual or automatic) at full or partial loads is assured with either modulating steam valves on NON-FREEZE tube coils or by face and by-pass dampers (THERMADJUST) to regulate the volumes of heated and by-passed air.

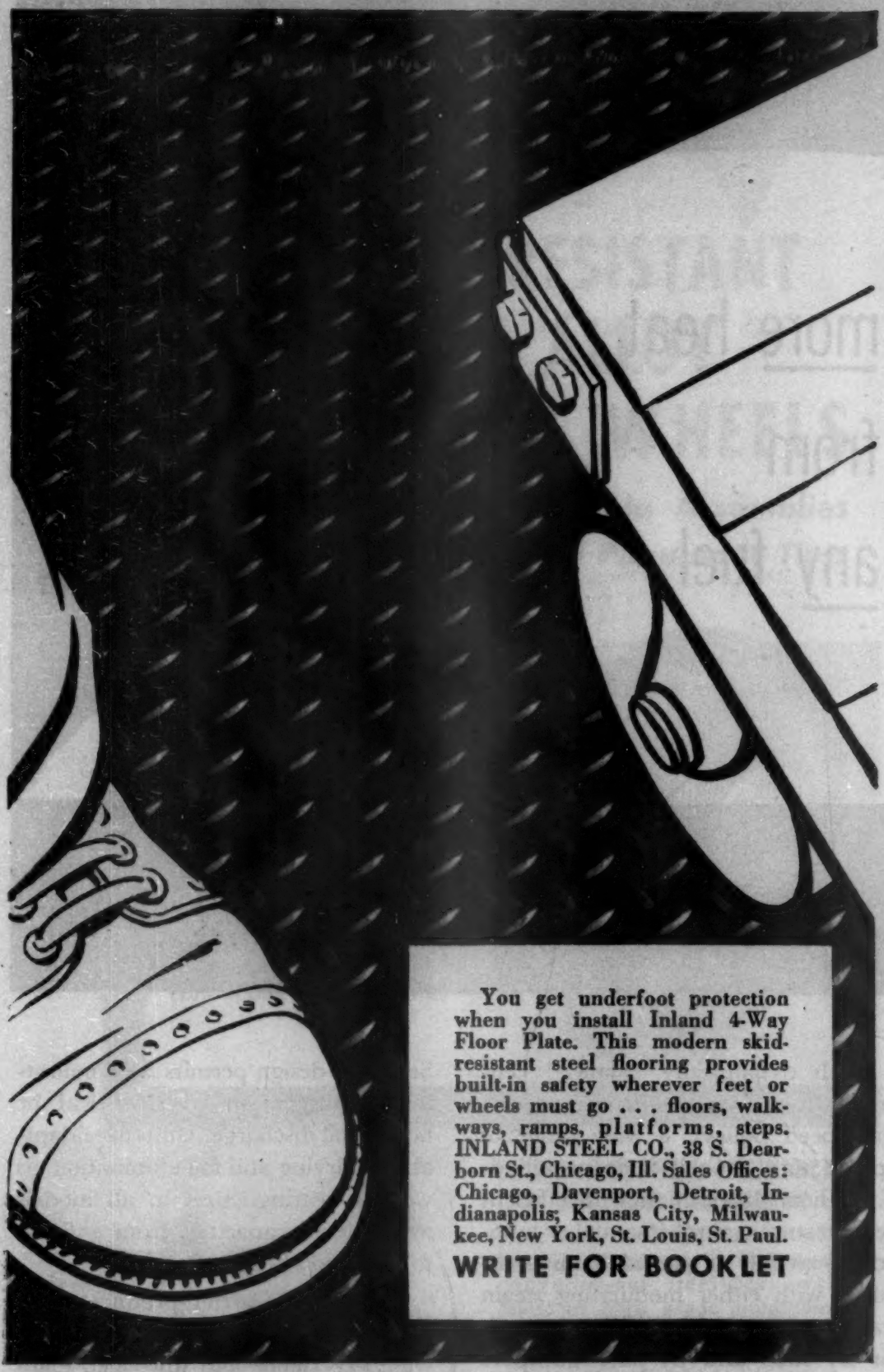
Carrier Heat Diffusers are shipped as complete units—ready to operate. Sectional design permits floor mounting or suspension with vertical or horizontal discharge. Units are adaptable to drying and fog elimination, as well as heating. Sizes in all models available in capacities from 156,000 to 1,570,000 Btu per hour.

Like every Carrier product, these efficient, long-life heat diffusers reflect wide experience and unrivaled engineering skill. These are added values that go along with Carrier industrial heating. Carrier Corporation, Syracuse, New York.

Carrier AIR CONDITIONING • REFRIGERATION • INDUSTRIAL HEATING

Safe Movement

OF MEN AND MATERIALS



You get underfoot protection when you install Inland 4-Way Floor Plate. This modern skid-resistant steel flooring provides built-in safety wherever feet or wheels must go . . . floors, walkways, ramps, platforms, steps. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis; Kansas City, Milwaukee, New York, St. Louis, St. Paul.

WRITE FOR BOOKLET

INLAND

Stocked by Leading Steel Warehouses

4-WAY FLOOR PLATE

odors, and holds them. Product is an odorless powder, said to give off no chemical substances, and to be non-toxic, non-corrosive, and harmless. Manufacturer states that it may be safely used dry or mixed with water wherever unpleasant odors are present. American Processing Co., Hippodrome Bldg., Cleveland.

•

WRENCH

Designed for use on pipe, tube, conduit, cable, and rod fittings in restricted areas where an ordinary ratchet cannot be used, T.A.C. open-end ratchet wrench has head which operates on a 7½-deg. arc. Ratchet heads, sockets, and accessories may be obtained separately or in sets. An adapter makes it possible to use standard sockets. C. J. Hendry Co., Distributors, 27 Main St., San Francisco.

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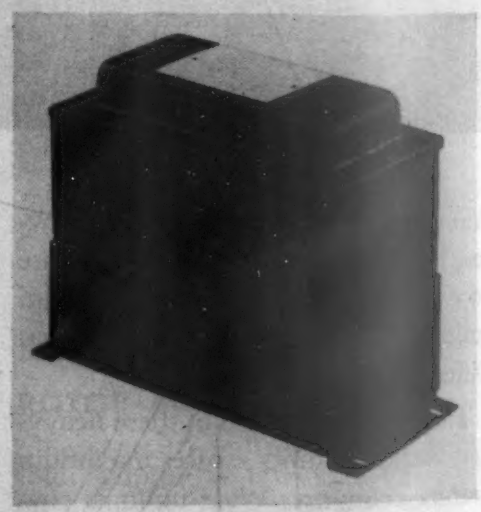
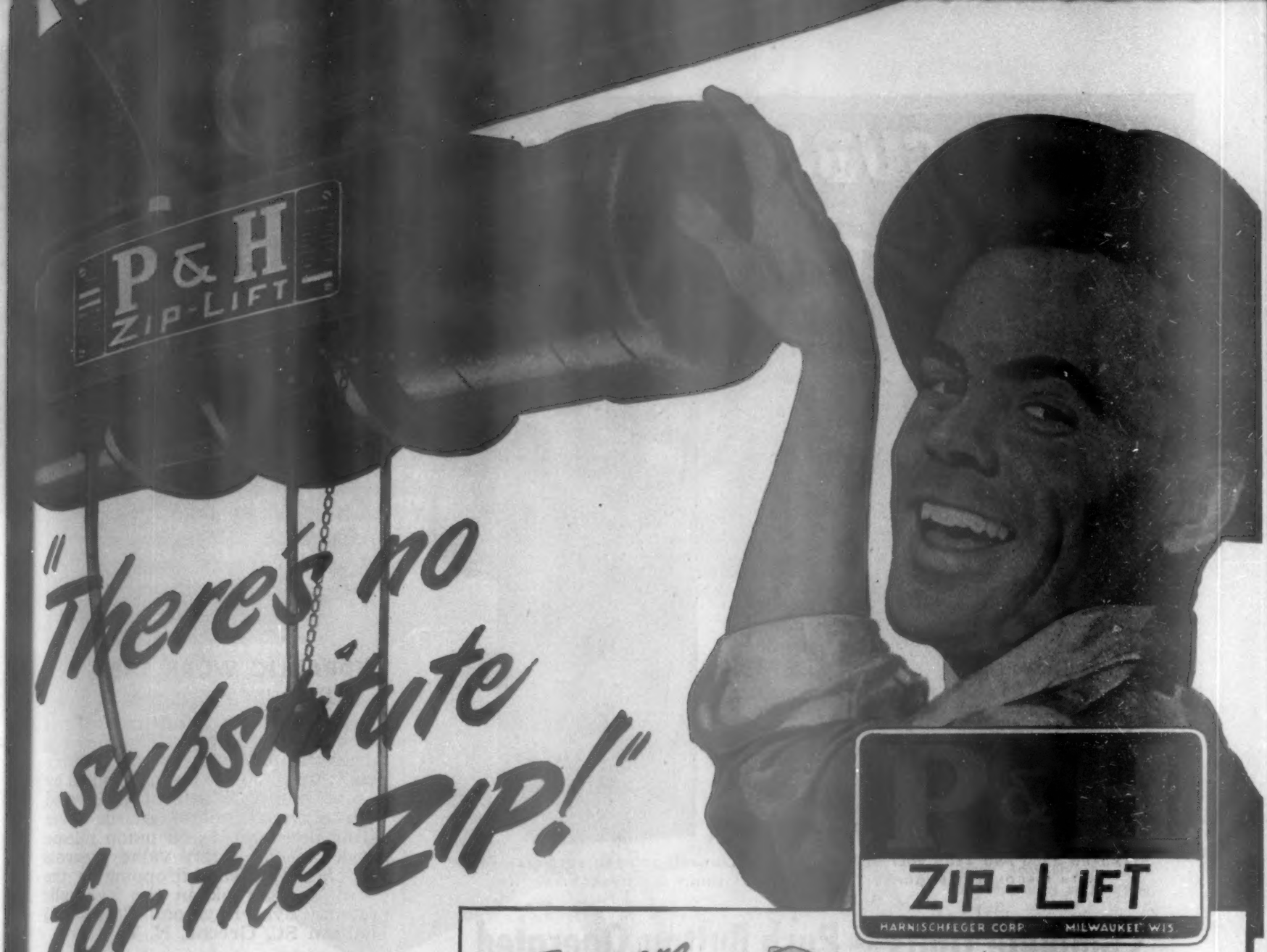


VOLTAGE STABILIZERS

Automatic stabilizers, VR-6000, for a.c. line voltage stabilization, are the magnetic type. They are designed for "building-in" as an integral part of electronic and electrical equipment, or for use as an accessory. Manufacturer states that they stabilize fluctuating voltages to within plus or minus one-half per cent at any load within rated capacities; have low temperature rise; are self-protecting on short circuit. Other stabilizers of identical voltage and frequency ratings may be connected



"There's no substitute for the ZIP!"

ZIP-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.

AT'S why I like to install these Zip-Lifts! y don't have to be replaced every few rs. They do everything *right*—and don't e us trouble. No wonder, experienced rs say— *"there's no substitute for a !"*

Zip-Lift is the small wire rope hoist with magnetic push-button control. It's the ndout in quality — with *added* values 'd expect only in the most expensive sting equipment. Benefit by proved ex- ience — tens of thousands of P&H Zip- s are now in service. Why not add one your handling now — to boost produc- and cut costs? They're available for mpt delivery.

t the facts on the P&H Zip-Lift today. k for Bulletin H20-4 — complete with plications, pictures, specifications, etc.

These are added values!

SAFER — Full magnetic control with control current reduced to 110 volts at the push-button. Plugging crane type limit switch and large double brakes provide maximum safety. No open wiring.

LIFETIME CONSTRUCTION — Precision built — shaved gears running in oil — grease-sealed anti-friction bearings—fully enclosed, moisture-proof, dust-proof, acid-proof.

SMOOTHER OPERATION — Motor specifically built for hoist service — high starting torque, frequent reversal, etc. Loads controlled within a fraction of an inch.

ALERT SERVICE — Out-of-stock delivery from qualified dealers everywhere—backed by 18 branch offices and 8 conveniently located warehouses.

The Zip-Lift is America's fastest selling wire rope hoist.

Handle it thru-the-air at lower cost

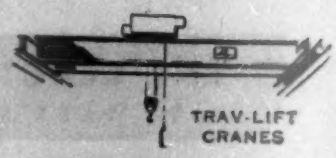
AVAILABLE IN CAPACITIES UP TO 2000 LBS.

P&H ELECTRIC HOISTS
4525 W. National Ave.
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION
HOISTS · WELDING ELECTRODES · MOTORS · EXCAVATORS · ELECTRIC CRANES · ARC WELDERS

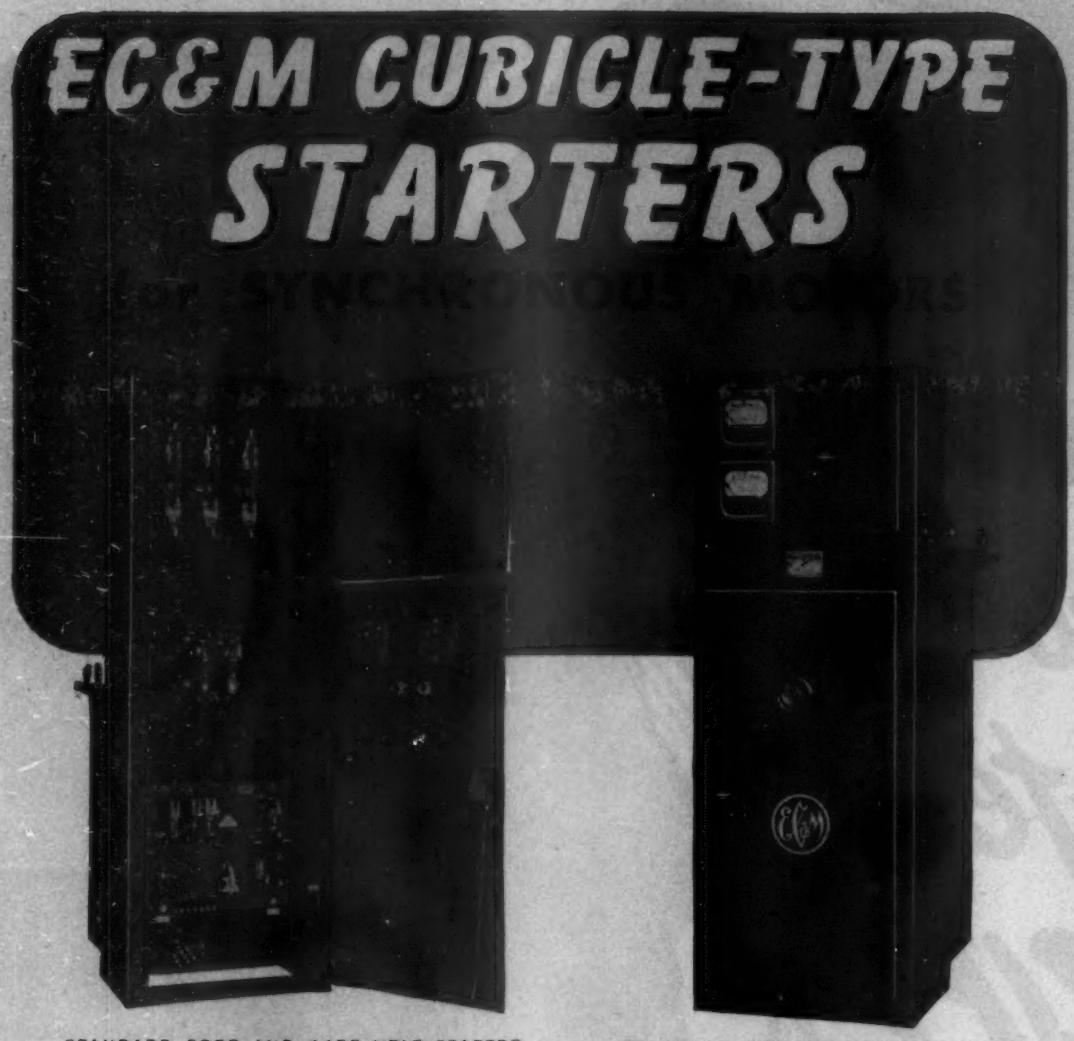
HEVI-LIFT

ZIP-LIFT HOISTS



TRAV-LIFT CRANES

EC&M CUBICLE-TYPE STARTERS



STANDARD 2300 AND 4600 VOLT STARTER WITH DISCONNECT SWITCHES

STANDARD 220-550 VOLT STARTER WITHOUT DISCONNECT SWITCHES

Complete Units -- Push Button Operated

with automatic field application by Polarized Field-Frequency Relay

WITH all internal wiring complete, and totally enclosed, these EC&M unit-type Synchronous Starters provide a quick, low-cost installation. They are shock-proof and do not require an expensive control room. Mounting them out in the plant, alongside the motors they control, keeps the length of heavy cable between motors and starters at a minimum, particularly those designed for reduced voltage starting.

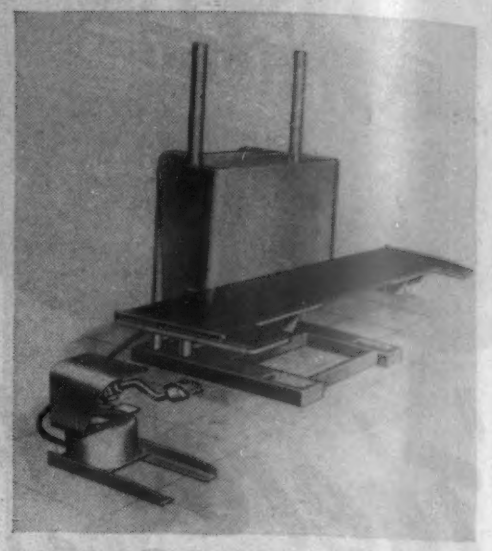
All starters are of the push button, magnetic type arranged to start the motor as a squirrel-cage motor, and then apply direct current field excitation when the motor has attained a speed most favorable for synchronizing. The Polarized Field-Frequency Relay operates *automatically* to pull the motor into step without pole slippage, with minimum current and maximum synchronizing torque.

Being sensitive to motor speed, the relay also operates to remove the field, should the motor pull out of step due to a dip in voltage or to an overload. If the motor has adequate torque to re-accelerate the load up to synchronizing speed, re-synchronization occurs automatically.

Write for Bulletins 1075-B, 1076-B, 1077-A and 1078-A

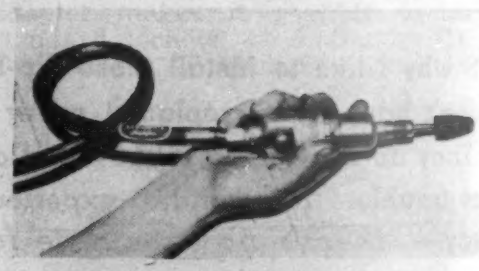
THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

in parallel for higher output watts. Available in standard models or custom-engineered, with terminal panel or with cord and plug. Equipment Sales Div., Raytheon Mfg. Co., Waltham, Mass.



HYDRAULIC WORK TABLE

Hydraulically elevated work table has a capacity of 500 pounds. It elevates from a lowered height of 4 inches to any convenient working height up to 30 inches. Controlled by a foot pump. Platform is covered with plywood; metal guards cover lifting mechanism and pump release petal. Special safety valve prevents the platform from dropping in the event of a break in the hydraulic system. Lyon-Raymond Corp., 5685 Madison St., Greene, N. Y.



AIR HOSE

Lightweight flexible air hose, called Highflex, for small tools, is covered with red braid for high visibility. Maker states that the light weight, which allows easier handling, reduces operator fatigue, allows the tools to be used in close quarters, and allows pulling around corners with very little kinking. The ¼-in. size weighs 8.8 pounds per 100 feet. Oil-proof, inside and out, it will not swell to cut air pressure or volume, and will not flake off and cause tool to jam or choke with rubber particles. Working pressures as high as 250 p.s.i. can be used with safety, according to manufacturer. The B. F. Goodrich Co., Akron.

TEXTILE MOTOR

Built with prelubricated, double-width, double-sealed ball bearings, textile motor has heavy section cast-iron bearing brackets with large openings, specially designed and finished to prevent accumulation of lint. Stator yoke is of cast iron with a smooth external contour to provide

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Overcome the handicap of obsolete handling methods—let Towmotor Mass Handling help you increase productive output in your plant. Versatile, gasoline-powered Towmotor Fork Lift Trucks and Towmotor Accessories provide all the benefits of modern handling techniques for every plant, large or small . . . handling raw materials and finished products of every size, shape and type . . . 24 hours a day. Turn to Towmotor for the solution to your handling problem. Follow the lead of the men who have to make handling pay a profit. More *professional handlers* use Towmotor than any other fork lift truck.

If your handling problems cannot be solved with a standard Towmotor unit, our engineers are available to analyze your procedures and design special equipment necessary to meet your specific needs. Details available without obligation.

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Towmotor Fork Lift Truck, Model LT-50, equipped with Towmotor Revolving Carriage Accessory for transfer movement of bulk materials.

RAM

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Division 5, 1226 E. 152nd St., Cleveland 10, Ohio

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...AND IT'S BACKED BY A NATION-WIDE ORGANIZATION SPECIALIZING IN FAST, EFFICIENT SERVICE

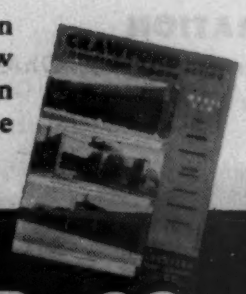
Many Crawford Doors are bought by people who first get acquainted with the Crawford organization through calling for service on some old, balky door.

Although Crawford Doors are notably free from troubles that necessitate servicing, the Crawford organization specializes in servicing all kinds of doors and knows the importance of working nights and week-ends in emergencies.

Service calls frequently involve old, balky, troublesome doors which are such wasters of time, man-hours and heat that the only sensible thing to do is replace them with quick-acting, tight-fitting, easy-working Crawford Doors for economy and safety.

All Crawford Doors have the exclusive "MARVEL-LIFT" mechanism which is so efficient that Crawford Doors as large as 14′ x 14′ can be operated by hand.

For service on your present doors or for estimate on power operators, remote controls or the finest in new doors, call CRAWFORD DOOR SALES CO. listed in the Yellow Pages of your local phone book. Or, write us for free literature.



Crawford DOOR CO.

408 St. Jean • Detroit 14, Michigan

free flow of ventilating air. Coil ends are enclosed in bakelite shields held in place by silicone compound and self-tapping screws that fit into drilled holes in the outside edges of the yoke. Available in 3, 5, 7½, 10, and 15 horsepower. Allis-Chalmers Mfg. Co., Norwood Works, Norwood, Ohio.

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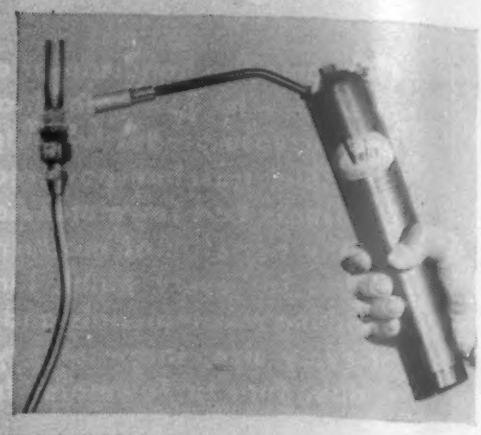

TORCH

Weighing 2 pounds, including capacity load of fuel, Vulco heating and brazing torch, for use on hard or soft solders, is said to burn 10 to 13 hours, with calculated flame temperature of 3660 deg., F., without refilling. It has no hose, and starts without preheating. Fuel supply, either propane or butane, is carried in the 2¼-in.-dia. body. Tests indicate that the torch will not burst under even extremely adverse conditions, according to maker. Furlo Sales Co., Distributors, 521 North LaCienega Blvd., Los Angeles 36.

•

UTILITY ATTACHMENT

Utility attachment, called "Clever Saw," for electric or air hand drills and flexible shafts up to 1700 r.p.m., converts rotary motion into reciprocating action for sawing, filing, honing, and polishing. It is adaptable to small bench or pedestal drills, and an interchangeable collet provides means for the adaptation of special trade and professional tools and instruments. All types of saw blades, from 3 to 4 inches long, are usable. Plastics, rubber, wallboard, plywood, bakelite, stainless steel, pipe, wood, corrugated metal and composition roofing, asbestos, and other materials can be cut with smooth surfaces which require no further finish, according to manufacturer. V-W Specialists, 35 South 69th St., Upper Darby, Pa.

•

FIRE DETECTOR

Designed to cover a broad temperature range, fire detecting device, called Detect-A-Fire, is suitable for both ordinary and explosion-proof applications. Temperature-sensitive element is the stainless steel casing, expansion of which, with temper-

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We are concentrating on production of this single industrial product. Stocks are now ample to make some immediate shipments. Free Engineering Service available on request, shows how Asbestone can be adapted to your needs.

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ature rise, is transmitted to the inner strut assembly, which magnifies the motion and operates the contacts. Strut construction is resistant to shock and vibration. Units are hermetically sealed, and can be spaced at 25-ft. intervals and 12½ feet from adjacent walls. Manufacturer states that its construction makes the unit re-usable in spite of exposure to flame for short periods. Any temperature setting up to 725 deg. F. may be specified, and calibration is done at the factory. Available with contacts open on temperature rise (Type 10) or contacts closed on temperature rise (Type 11). Fenwal, Inc., Ashland, Mass.

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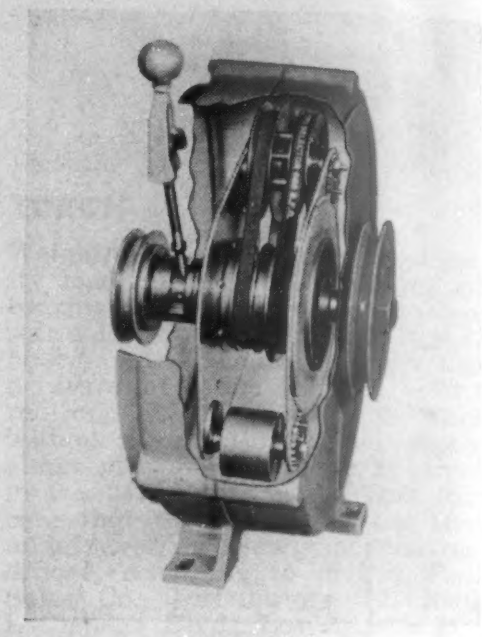

SPEED CONTROL

Five-horsepower speed control is said to have unlimited ratios, split-second control of speeds from 0 to 800 r.p.m. and into reverse where needed. Selectors have cast-iron sheaves on hardened and ground shafts, and guide pins with sealed prelubricated ball bearings, mounted in cast aluminum housings. Optional V-belt or flexible coupling input and output makes controls adaptable for mounting in any position on new or existing equipment. Speed Selector, Inc., 118 Noble Court, Cleveland 13.

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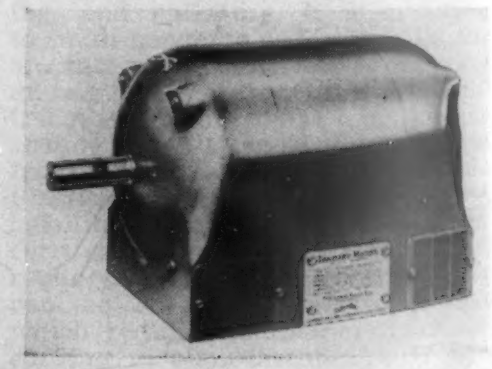

MOTORS

Surface of streamlined motor, for use in plants where sanitation is essential, is free of cracks or depressions. Available in ½- to 2/3-hp. sizes. Low ratings are available in totally enclosed, non-ventilated models. Larger ratings are splash-proof, and supplied with removable stainless steel grille plates over the cooling air inlets and outlets. Base is enclosed by

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WRIGHT SPEEDWAY ELECTRIC HOIST

Fast. Safe. SPEEDWAY electric hoists slash your materials handling costs—increase your production. Features? Plenty—and only Wright offers you all these in the light hoist field:

1. **Grooved drum**
2. **Full 12-foot lift with no over-winding**
3. **Preformed wire rope with swaged fitting for anchoring**
4. **Timken tapered roller-bearing trolleys**
5. **Standard NEMA motor frames and ratings . . . many other advantages. Capacities from ¼ to 1 ton.**

Call your Wright distributor or write us at York, Pa., for descriptive folder DH-1250.

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In Business for Your Safety

BETTER LIGHT for the Eyes of Industry

APPLETON "GOODRICH" STOCKLITE — Developed to adequately illuminate shelves and bins in narrow stock aisles.

Patented January 10, 1933
Patent No. 1,894,227

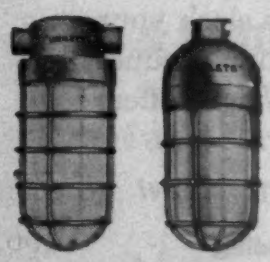
APPLETON LIGHTING EQUIPMENT

Depend on Appleton Lighting Equipment for the illuminating efficiency that spells better industrial workmanship, smoother production. Specify APPLETON and be sure of lighting fixtures that are expertly engineered for superior illumination, lower maintenance.

The Appleton "Goodrich" Stocklite shown above is typical. Diffusing light from eight different reflecting surfaces, the Stocklite provides the proper distribution of light in narrow stock aisles, without spotty distribution or unpleasant glare.

Hundreds of lighting specialties of equally expert design comprise the *complete* Appleton Line of ruggedly built fixtures, meeting virtually every industrial requirement—indoors or out. Now including the famous line of lighting specialties formerly manufactured by the Goodrich Electric Company, Appleton Lighting Equipment points the way to better lighting at minimum service, installation and operating cost.

Use the big Appleton Catalog for convenient purchasing of all electrical equipment. This big buying guide is a fully detailed and graphically illustrated listing of the more than 15,000 items in the Appleton Line — all "STANDARD FOR BETTER WIRING". The Appleton Catalog will be mailed to any user of wiring and lighting material immediately upon request.



APPLETON VAPOR-TIGHT FIXTURES

Newly designed. Made of tough malleable iron. Also available in the complete Appleton Line are Explosion-Proof and Dust-Tight Lighting Fixtures, blanketing all requirements for hazardous locations.

Sold Through Electrical Wholesalers

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APPLETON ELECTRIC PRODUCTS

APPLETON
CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES
EXPLOSION-PROOF FITTINGS • REELITES

the motor housing; access to mounting bolts is through the removable grille plates. A built-in conduit box may be used, or conduit may be brought into the motor through the side or bottom of the motor housing. Supplied with the Type C flange for pump applications. For vertical shaft or flange mounted applications, a round frame, non-ventilated motor with conduit box built into the end bracket of the motor is available. The Louis Allis Co., Milwaukee 7.

•

PROTECTIVE TAPE

Protective coating in an adhesive roll, called No-Ox-Id Wrap, was developed to guard lead-sheathed cables from corrosion. It is water repellent, and corrosion-inhibitive qualities provide a protective film to keep cable free from pitting, according to maker. It can be applied manually by winding the wrap spirally, with ½-in. overlap. Tape is 1/32 inch thick; rolls are 2 inches wide, 25 feet long; each roll is cellophane wrapped, and manufacturer says it can be stocked indefinitely without deterioration. Dearborn Chemical Co., 360 North Michigan Ave., Chicago 1.

•

HYDRAULIC CRANE

Two-thousand-pound hydraulic truck crane, called Hydro-Lift Model T, is designed for mounting through the floor of the truck body in a rigidly braced socket. It is suitable for loading and unloading engines, large truck axles, transmissions, or any heavy equipment. According to manufacturer, double-acting manually operated hydraulic pump allows loads to be raised or lowered at any speed desired; full capacity load is lifted 77 inches in 37 seconds. Pump may also be arranged with motor drive or connected with the hydraulic system on the truck. Heavy-duty

Your plant garage —

is a fire-danger spot —

BEST PROTECTED BY *Kidde* PORTABLES

When trucks are being serviced—or filled with gasoline—your plant garage could be the scene of a fire causing serious damage to the building—perhaps total destruction of your trucks! Don't give garage fires a chance to spread—keep *Kidde** Portable Extinguishers right at hand!

With a *Kidde* Portable, you can act fast against fires in flammable liquids—or electrical wiring on trucks. Carbon dioxide (CO_2) cannot damage equipment or materials, or corrode metal parts. And it leaves no unsightly mess to clean up—not even moisture!

All *Kidde* Portables, from the 2½-pound size to the 25-pounder, have TRIGGER-FINGER CONTROL—the simplest way known to operate an extinguisher. Ask a Kidde representative for full details.

*Also known as "LUX"

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OIL RE-REFINERS AND FILTERS

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VALVES, CYLINDERS, SPHERES
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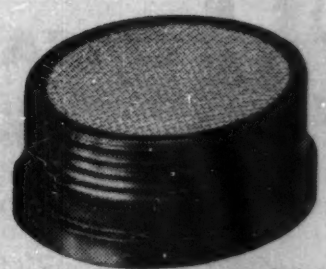
OIL HEAT TRANSFER UNITS

for New protection against Old hazards ...get WILLSON

Style No. X41

GLOVE-FIT PROTECTION AGAINST SPLASH ... This Over-All* rubber goggle with snug fitting resilient rolled edge takes the danger out of splash and spatter; provides wearing comfort over spectacles.



Style No. 731

ONE-PIECE CAP CARTRIDGE ... New chemical cartridge respirator with four interchangeable cap cartridge filters protects against low concentrations of specific vapors and gases. U. S. Bureau of Mines Approved.

Style No. 750D

SETTLE THE DUST PROBLEM ... Newly approved by Bureau of Mines for all dusts. Easier breathing over long periods provided by extra large dual throw-away filters.

*Reg. U. S. Pat. Off.

For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest Willson distributor or write us direct.

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DOUBLE-WILLSON

PRODUCTS, INCORPORATED

219 WASHINGTON STREET, READING, PA., U. S. A.

45-in. boom is constructed of structural steel, swings 360 degrees, folds down into frame when not in use. If a longer boom is required, a 16-in. extension may be attached. Cardinal Corp., St. Paul, Minn.

AIR CIRCULATOR

Model 1700 air circulator, which replaces manufacturer's former model 17R, has a one-piece plastic propeller and all-chrome base and guard. A carrying handle is mounted on the chrome motor housing. Unit has a visual speed control and three speeds, 1600, 1200, and 800 r.p.m. Designed for 115-volt, 60-cycle, a.c. and uses 105 watts at top speed operation. Weighs 19 pounds. Fresh'nd-Aire Co., Div. of Cory Corp., 221 North LaSalle St., Chicago 1.

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CONVEYOR BELT

Woven wire conveyor belt, called Twistex, is designed to permit continuous movement of work through washing, drying, treating, or cooling machines using low or high temperature processes. The mesh size can provide up to 87 per cent open area. Coiled wire construction is said to utilize the maximum strength of the metal from which the belt is made, which can be any metal or alloy. Available in a wide variety of meshes (openings), and for sprocket or roller drive. Cambridge Wire Cloth Co., Cambridge, Md.

•

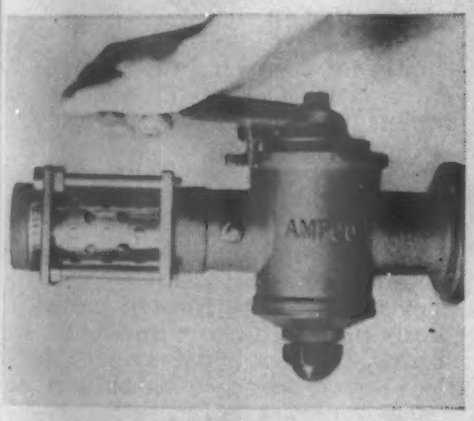
CENTRIFUGAL PUMPS

Line of centrifugal pumps for handling liquids is available in single and 2-stage units ranging from ¼ to 75 horsepower, and from 10 to 2500 g.p.m., including a self-priming type. Suitable for a variety of applications and for viscosities up to 8000 S.S.U. Four models available: Close-coupled with common shaft, two feet under pump and two under motor; close-coupled with pump mounted on extended motor shaft and pump adapter, four feet under motor; pump mounted on base plate, with or without motor and flexible coupling; self-priming pump mounted on base plate, with or without motor and

flexible coupling. Constructed of all iron, bronze fitted, or all bronze with steel shafts; closed or open impellers. Bowser, Inc., Fort Wayne 2, Ind.

SKID DUMP

Scrap, castings, and other heavy materials can be hauled and dumped with Model MF-1 Skid dump, used with either platform or fork lift trucks. Hopper is fabricated from 3/16-in. steel plate, with rolled edges, formed channel legs, and heavy-duty welded undercarriage. Capacity is 24.1 cubic feet or 0.9 cubic yard, full; with a 6-in. surcharge, 30.25 cubic feet or 1.11 cubic yards. Phillips Mine & Mill Supply Co., 2227 Jane St., Pittsburgh 3.



BRONZE PLUG VALVE

For use wherever contamination of liquids is undesirable, aluminum bronze plug valve can be furnished with flanged, threaded male or female, or hose coupling thread. Provision is made for pipe connections for flow meter, gage, bypass clean out, gas injector on the 2-in size. The 3-in. size can be furnished 2- or 3-way as desired. Made in sizes ½ to 4 inches. Removable metal-protected sight glass of pyrex is optional. Ampco Metal, Inc., 1745 South 38th St., Milwaukee 4.

SOLVENT

Liquid, called Corodex Coil Clen, is said to dissolve lime scale and mineral deposits from copper, brass, bronze, iron, or stainless steel coils in various types of equipment, without injury to the coil or surrounding parts. The coil does not have to be removed, manufacturer states. Contact between the liquid and the scale

How Shipper Saves $30 per car

Acme methods and Unit-Load Band help chemical shipper save time, materials on carload shipments

ACME FULL-FLOATING LOAD METHODS with Acme Unit-Load Band mean an easier "ride" for shipments, less shock damage in transit, safe arrivals. These pictures show double-decked carload of barrels of ammonium thiocyanate flakes on its way to be used in making insecticides, adhesives, and dye fixatives.

Eastern Gas and Fuel Associates, Everett, Massachusetts, market a by-product of coal (ammonium thiocyanate flakes) widely used in the chemical industry.

Carload shipments call for loadings of two hundred barrels, 200 pounds each, double and triple decked.

By using Acme full-floating load methods and Acme Unit-Load Band in place of the previous wood bracing method, this company saves approximately thirty dollars in time and materials on every car shipped.

This is just one instance of our ability to help get substantial savings for shippers. Whether you ship by the bag, box, or barrel, ask an Acme Shipping Specialist how we can help you. Or clip and mail the coupon for free booklet of actual case histories.

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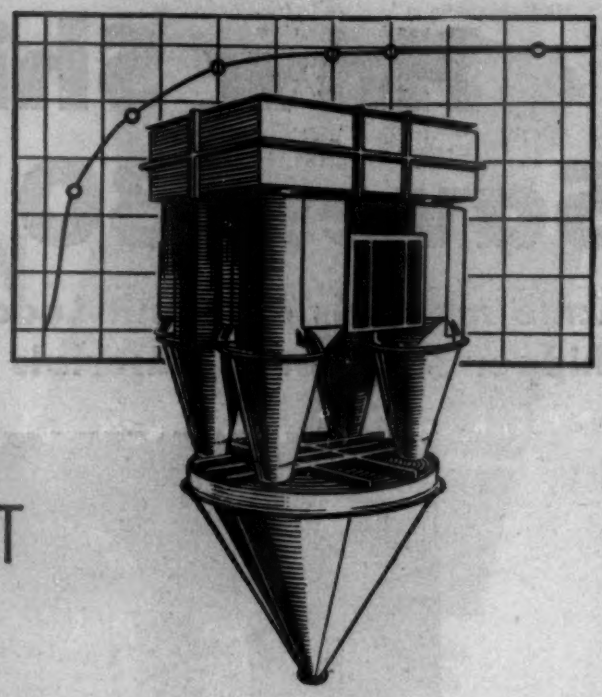

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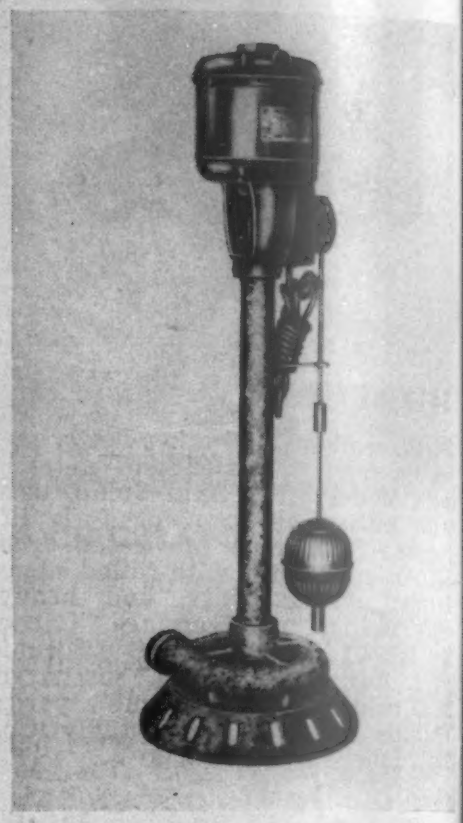
FORESIGHT
IS FAR-SIGHT
IN PLANNING
dust
RECOVERY

Blind buying is bad business. It's far better to know just how well new equipment is going to do its job—*before* you buy. With Buell dust collection systems you *can* know—fully and exactly—how well your dust problem will be solved. Buell offers a unique, pre-order, *fractional* efficiency guarantee. It's the *only kind* of efficiency that accurately predicts dust collector performance. What's more, the guarantee figures may pleasantly surprise you, for only the Buell system has the patented van Tongeren 'shave-off', a really important efficiency development. The complete facts are in a new 32-page catalog—write to the Buell Engineering Company, 12 Cedar Street, New York 5, N. Y.

buell
Engineered Efficiency in DUST RECOVERY

results in foaming action, which continues until the unit is clean. It is claimed that even a completely lime-blocked passage can be opened with this liquid, which is non-explosive, non-flammable, and not harmful to metal or to the hands of the user. Available in any quantity from 1 to 55 gallons. Allied Products Co., Dept. C-28, 1133 Newport Ave., Chicago 13.



SUMP PUMP

Rustproof sump pump, known as the Automatic Cellar Drainer, is designed to deliver up to 3000 g.p.h. without clogging or stalling. It is fitted with a heavy galvanized cast-iron base, which is said to insure stability, even in mud. Furnished with a centrifugal-type pump protected by galvanized steel screen to prevent entry of foreign particles, a semi-open bronze impeller, steel shaft, stainless steel sleeves, a 1/3-hp. electric motor with built-in automatic overload, a heavy copper float, automatic switch, and moisture-proof drop cord. The Roy E. Roth Co., Rock Island, Ill.

FLEXIBLE TUBING PARTS

Flexible tubing parts, with snap-on couplings, are interchangeable on nipples of various sizes. For instance, a ⅜-in. coupling body fits ¼-, ⅜-, and ½-in. nipples. The ¼- and ½-in. bodies also fit all three nipples. The degree of interchangeability varies with the type of coupling and with the size, but manufacturer

Put HINES SHELF

ANYWHERE . . . ANYTIME . . . IN ANY ARRANGEMENT . . .

FOR PERMANENT OR TEMPORARY USE

Ideal for shelving at the bench

An entire room or whole wall can be fitted

IMMEDIATE *Delivery*

Made in one basic unit—3 ft. wide, 34 in. high, and 11½ in. deep—will carry over 600 lbs. evenly distributed over the 3 shelves which total 9 sq. ft. of shelf area.

CARTON PACKED

FLEXIBLE . . . STURDY . . . VERSATILE

Fine Appearing

Here is shelving that ideally meets practically every factory need—it is inexpensive—tailor-made for the application, simple to assemble—strong and durable.

The flexibility of these shelves and the extension units make it possible to arrange them exactly in accordance with your layout. Being free standing and in multiples of three feet the shelving can be run to any length—you save time, labor, material, and money.

No nailing or sawing required to install—only a screw driver needed to assemble the Ponderosa Pine frame, Masonite Tempered Presdwood shelves, and special hardware.

The shelving is carton packed in compact form—easy to store—quickly available when you require additions.

EDWARD HINES LUMBER CO.
2431 S. WOLCOTT AVE.
Chicago 8, Ill.

HEIN-WERNER HYDRAULIC JACKS

THE SUPERIOR INDUSTRIAL JACK

LARGE SOLID STEEL BASE gives firm, solid footing, prevents tilting under load.

PRESSURE TESTED malleable iron used in top nut and in handle sockets afford extra strength at points of greatest strain.

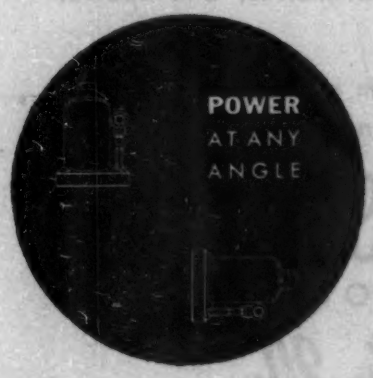
HEINITE PISTON is an exclusive H-W achievement. It withstands ten times the wear of conventional cups or packing.

CANNOT LOWER ACCIDENTALLY as handle must be removed from pump to open release valve.

ALL H-W MODELS are factory-tested at 1 ½ times their rated capacity.

If you like to figure out short cuts, devise easier ways of doing things, or develop "special equipment" which will enable a factory to turn out better work in less time, you'll find many applications for H-W Hydraulic Jacks. They're great for many different moving, bending, pressing, pushing or lifting operations.

Made in models of 1½, 3, 5, 8, 12, 20, 30, 50 and 100 tons capacity. Consult your nearest industrial supply distributor or write us for details.



Hein-Werner HYDRAULIC JACKS

HEIN-WERNER CORPORATION • WAUKESHA, WIS.

claims that only a relatively few sizes need be stocked to fit nipples of all sizes from ¼ to 2 inches. Ronaflex Tubing Co., Inc., Packard Bldg., Philadelphia 2.

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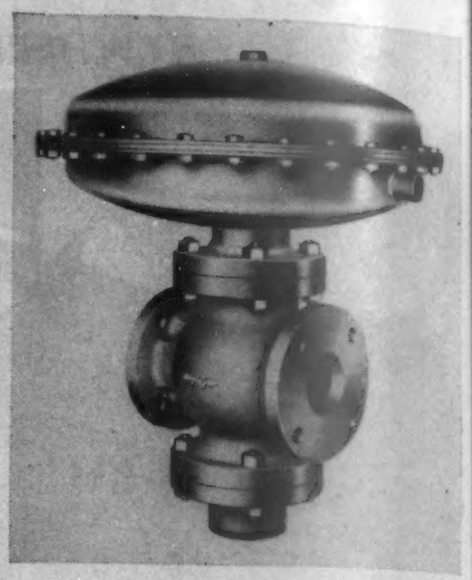

DIAPHRAGM CONTROL VALVES

Series 4000 "Flo-Tested" pressure-loaded diaphragm control valves are designed to provide regulation wherever controlled fluid may come in direct contact with the diaphragm. Fluid pressure from the outlet side of the body is applied to the under side of the diaphragm instead of springs; loading pressure from a remote operator or air-operated instrument is applied to the upper side. Suitable for back pressure and reducing service, as well as rate-of-flow control. When firing boilers or stills on natural gas, valves are said to prevent inlet pressure variations from disturbing the controlled gas pressure. Hammel-Dahl Co., 243 Richmond St., Providence 3.

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BENCH GRINDER

Powered by a ¼-hp. ball-bearing induction motor, No. 266 bench grinder is suitable for light grinding, sharpening tools, buffing, polishing, and wire-brush work. Features include safety-type wide wheel guards, adjustable tool rests, toggle-type switch enclosed in a molded case located in the base of the grinder. Guards are adjustable to permit grinding at any point on the circumference of the wheel. Furnished with 6x2-in. wheels, one coarse, one fine. Stanley Electric Tools, New Britain, Conn.

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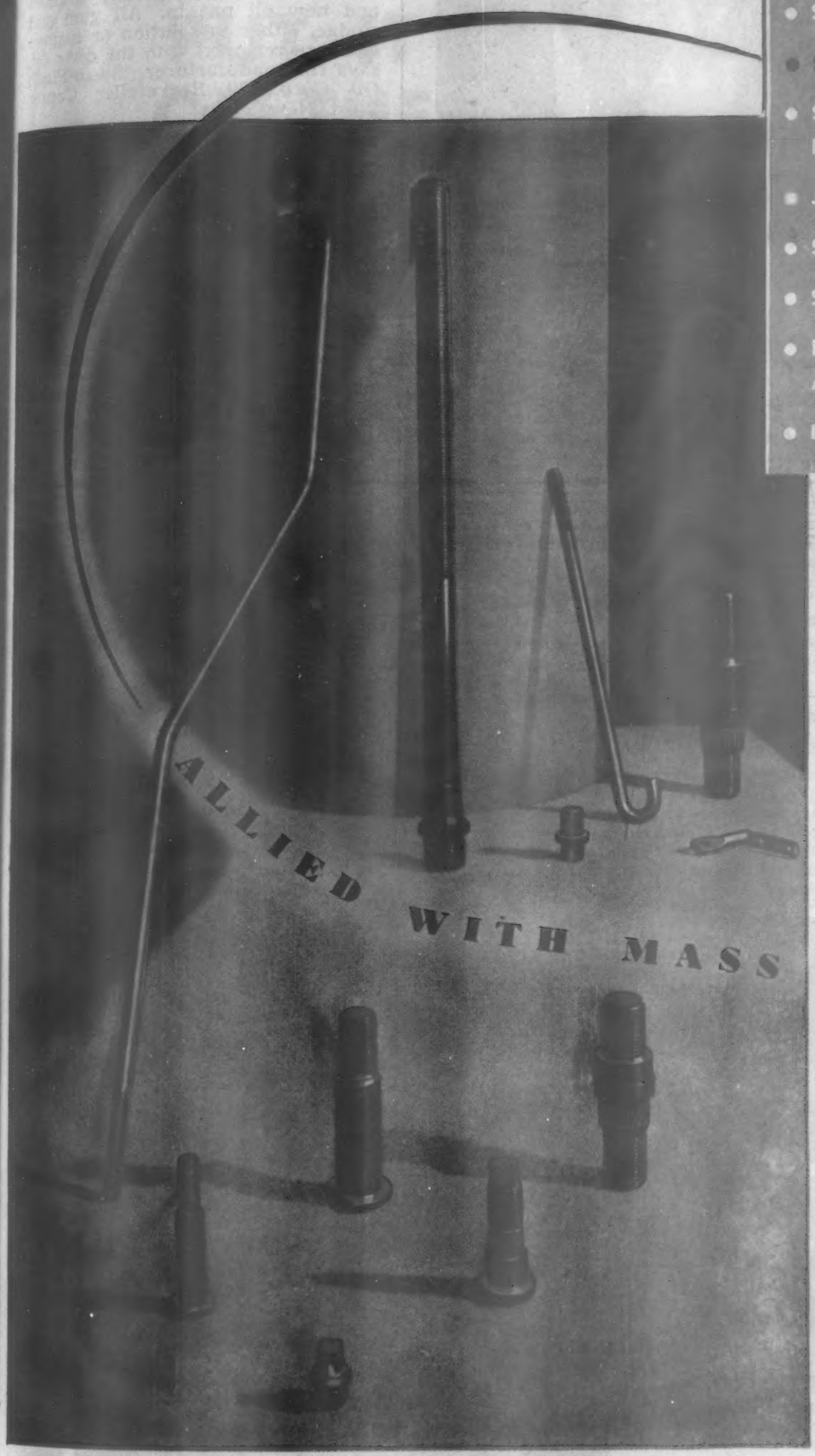
SOLVENT

Sludge and gum solvent, known as Hydro-Solv A, when added to regular hydraulic oils is said to remedy



- HARDENED AND PRECISION GROUND PARTS
- STANDARD CAP SCREWS
- SPECIAL COLD FORGED PARTS
- SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST
- JIGS ✦ FIXTURES
- STEAM HEATED PLASTIC MOLDS
- SPECIAL PRODUCTION TOOLS
- R-B INTERCHANGEABLE PUNCHES AND DIES
- DIE MAKERS SUPPLIES

Innumerable parts ordinarily produced by more expensive methods can be cold forged. Tolerances as close as are required for most machined parts can be secured . . . greater strength and durability are obtainable . . . and, through proper engineering and production methods, costs can be reduced materially.

Allied can give you every benefit of this type of production. Send us your part prints for quotation.

PRODUCTION

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ALLIED PRODUCTS CORPORATION

DEPARTMENT 41

4632 LAWTON AVENUE DETROIT 8, MICHIGAN

NEW

IMPROVED
AMERICAN
FLOOR MACHINE
Safety-Grip
HANDLE!

...for Cleaner and Safer Floors!

Now... *new safety* and *new labor-saving features*... in the new Improved American Deluxe Floor Maintenance Machine! Ideal for keeping factory and office floors *cleaner* and *safer!*

Safety... *new Safety-Grip Handle*—easy to control with either or *both* hands. Merely grip the handles to get positive "off-on" action. Machine runs only when you want it—won't start accidentally when plugged in.

See its fresh, clean "New Look" —highly polished aluminum castings throughout.

Power... has *big power* ample for any floor maintenance operation. Maintains full power and brush speed on the smoothest to the most rugged floors. See it *now!*

Attachments to maintain all kinds of floors include: Tampico, Mixed Fibre, Palmetto, Bassine, Wire, Steel Wool, Burnishing and Sanding discs. Made in Three Sizes —13, 15, 17 Inch.

AMERICAN
FLOOR MAINTENANCE MACHINES

Send coupon for prices or FREE DEMONSTRATION!

The American Floor Surfacing Machine Co.
588 So. St. Clair St., Toledo 3, Ohio

☐ Send free description and prices.
☐ Please arrange a FREE Demonstration of the new American DeLuxe Maintenance Machine with Safety-Grip Handle, no obligation.

Name.....
Street.....
City.....State.....

any sluggish operation caused by contaminants. From 100 to 150 working hours are needed for effective action of the solvent, after which the system should be completely drained and new oil put in. All gum and sludge, either in solution or suspension, are removed with the dirty oil, says the manufacturer. Swan-Finch Oil Corp., 30 Rockefeller Center West, New York.

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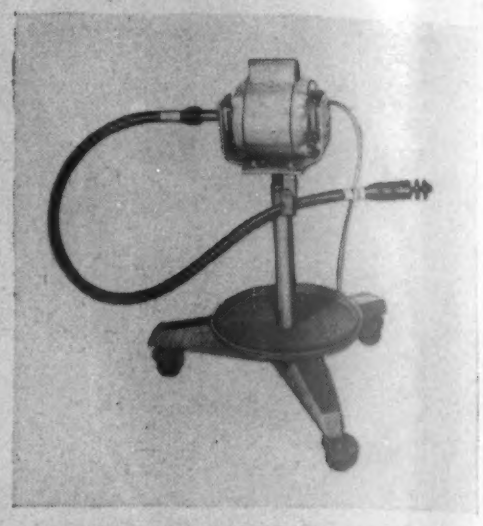

FLEXIBLE SHAFT MACHINES

Line of light-duty, portable flexible shaft machines, known as Lightnings, is suitable for use by repair shops, welding, and sheet-metal workers. It comprises both ¼- and ½-hp. single-phase motors, with speeds of 1725 and 3450 r.p.m., mounted on a high pedestal that may be used for both bench and shop work. Motors of both sizes are equipped with either 5- or 6-in. flexible shafts, each with a ⅜-in. dia. core in a 15/16-in. casing. Tool tray on the base accommodates both power and hand tools. Stow Mfg. Co., Binghamton, N. Y.

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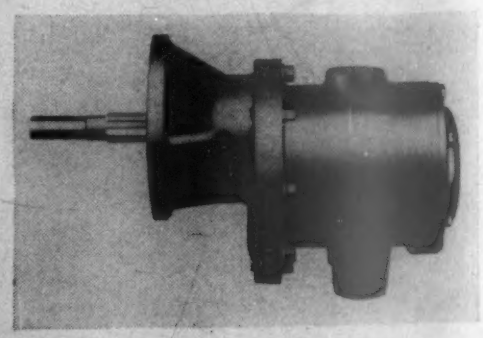


AIR MOTORS

Two sizes of air motors are intended for use as starters for internal combustion engines. They are keyed or splined to the starting mechanism and the engine is then cranked. They are designated sizes 9BM and 20BM, the former having 9 horsepower and the latter 20, at air pressure of 90 p.s.i. Motors are 13 3/16 and 14½ inches in over-all length. They are of the "Multi-Vane" type, and a single step spur gearing is used to obtain the required speeds. Ingersoll-Rand Co., 11 Broadway, New York 4.

•

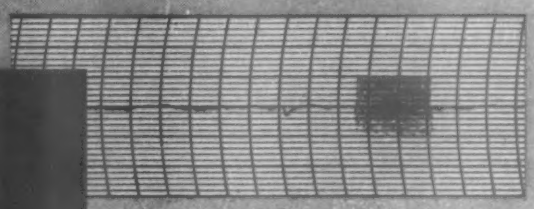
PROTECTIVE COATING

Sandy-textured wall coating, called San-Finish, can be applied to both interior and exterior walls, to form

PUT IT ON THE BLANCHARD

MAKE BETTER, LONGER-LASTING PARTS WITH FINER, FLATTER SURFACES

-Eliminate Lapping!



SURFACE FINISH CHART OF BLANCHARD-GROUND PIECE, USING BRUSH SURFACE ANALYZER WITH ATTENUATOR SET AT .01. SURFACE HAS ROUGHNESS VALUE OF ONLY 2 MICRO-INCHES.

3″ Valve Plate for Hydraulic Pump. Hardened Steel.

Checking flatness of Blanchard-ground surface with optical flat. Parallel lines show surface is flat within ½ light band. (5.8 millionths of an inch.)

Cast Iron End Plate for Refrigerator Compressor.

The optical flat shows this Blanchard-ground surface flat within ½ a light band.

Checking flatness of production-lapped piece received from customer. Note the variation from flatness as shown by the curved lines.

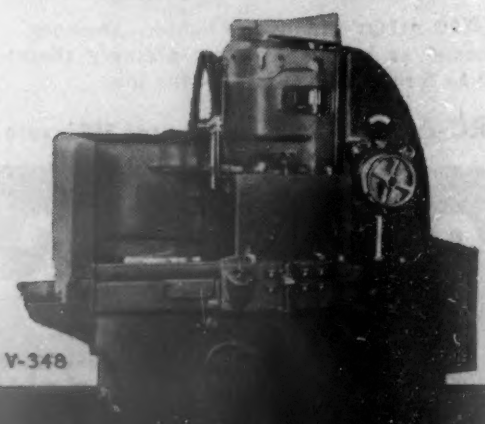
As you know, the operation of lapping charges the worked-upon surfaces with lapping grit. The presence of this lapping grit — which is practically impossible to remove — lowers the ability of the lapped surfaces to resist wear.

Blanchard research has perfected a method of flat surface grinding — using only their standard Blanchard Grinders — whereby extremely fine finishes *and* extreme flatness can now be produced in *quantity production*. The illustrations show what is being accomplished. Lapping and all other subsequent finishing operations are eliminated.

Such Blanchard-ground parts show useful life increase of up to 5 times that possible with lapped parts. Joints are tighter and withstand pressures as high as 3,000 lbs. oil per sq. in. without leaking.

If you have critical flat surfaces that require extremely fine finishes, close sizing and extreme flatness — and would like to produce them in the best and least expensive manner — it will pay you to get the advice of Blanchard engineers.

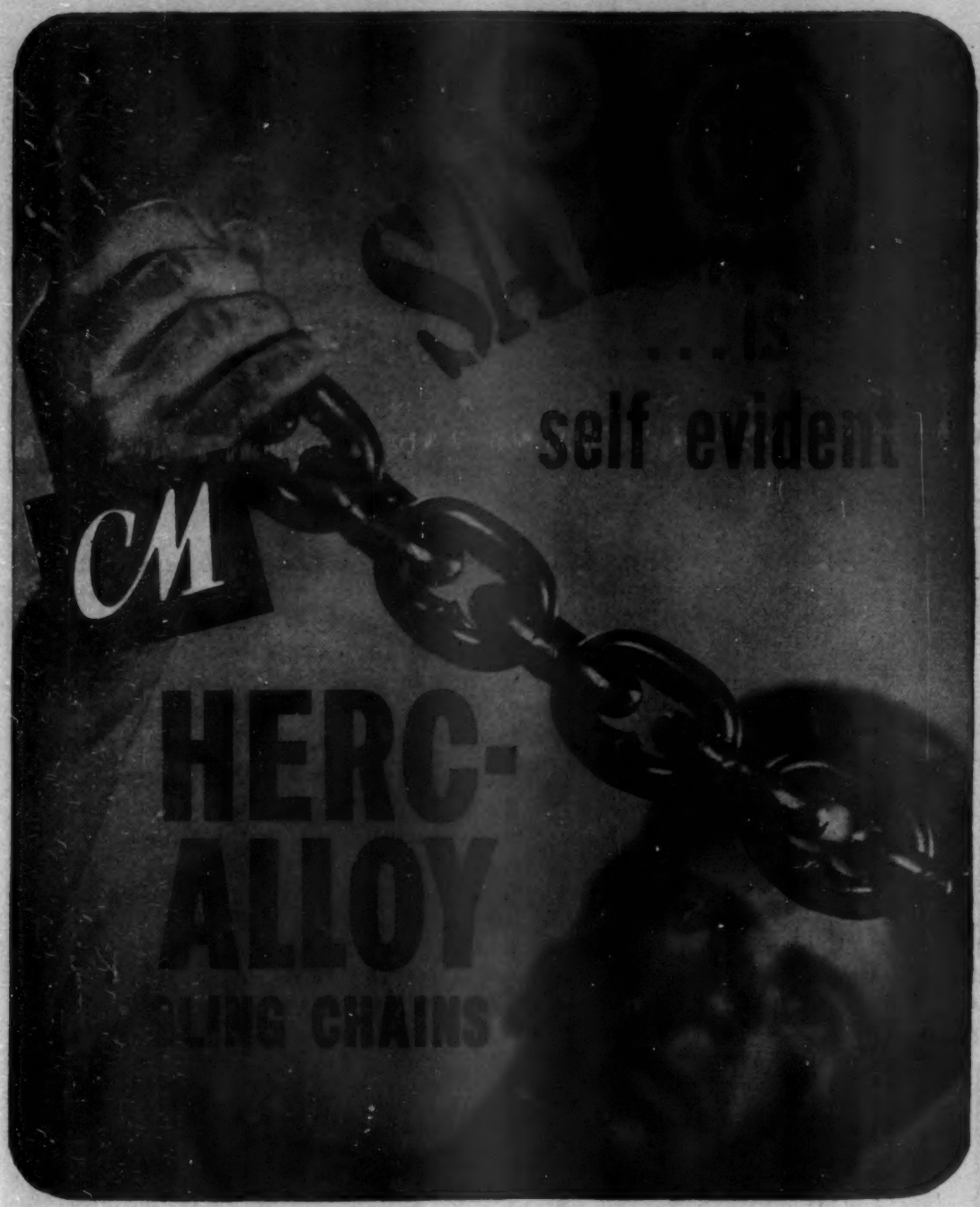
Simply send us the data, with samples if available and practical. This Blanchard Service is of course free and does not obligate you.



BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



HERC-ALLOY FEATURES

- America's *first* alloy steel sling chain... first to bear a serial number.
- Every CM HERC-ALLOY Sling Chain is alloy steel throughout... links, rings, hooks. There is only one grade... *the best.*
- Every chain is individually tested and accompanied by a certificate of registration.
- Links are side welded for maximum strength by patented INSWELL electric method.
- HERC-ALLOY Chains should *never* be annealed.
- HERC-ALLOY Chains are lighter... stronger... easier to handle... outlast ordinary chains 4 to 5 times... cost less on the job.

HERC-ALLOY... the chain you can *SEE* is safe

- A simple visual inspection* is all that is needed to determine the continued serviceability of a HERC-ALLOY Chain. That's why more and more of the important companies are standardizing on HERC-ALLOY... because HERC-ALLOY Chains are immune to unseen dangerous crystallization... because you can see when a HERC-ALLOY Chain needs repairs or replacing.

Write for your copy of this new, informative booklet. No charge.

COLUMBUS-McKINNON
CHAIN CORPORATION

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GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York • Chicago • Cleveland • San Francisco • Los Angeles

See us at Booth 116 National Safety Congress
Stevens Hotel — October 18 to 22 — Chicago

a hard, tough, yet flexible surface. Can be applied with a brush, or sprayed. Controlled penetration makes it adhere to masonry or wood. It also adheres to polished surfaces such as glass or metal. No undercoat or primer is needed, states the manufacturer, who says that one heavy coat of the mixture may be used in place of plaster, prime coat, or finish paints. Covers blemishes and cracks in old walls; used in pre-fab and dry wall construction; fills in to make a solid surface where joints are closely fitted or filled. Said to be moisture resistant and washable; will not blister, becomes soft, or support combustion. Seven pastel colors and white, to which oil colors may be added. Alton Laboratories, Chicago.

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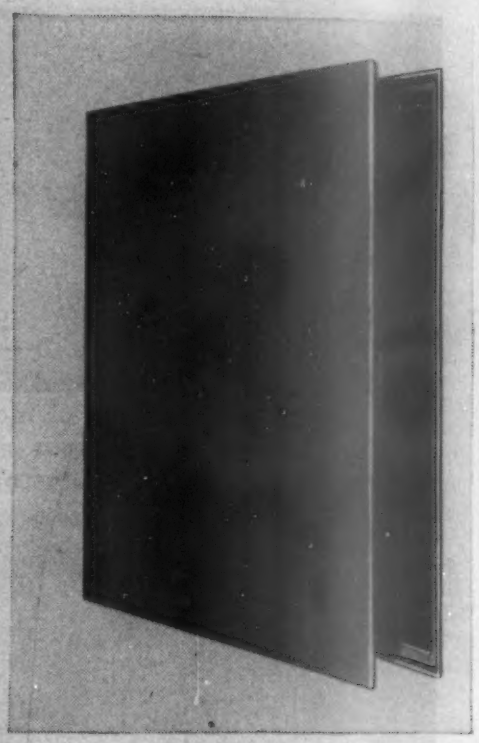


STEEL DOORS

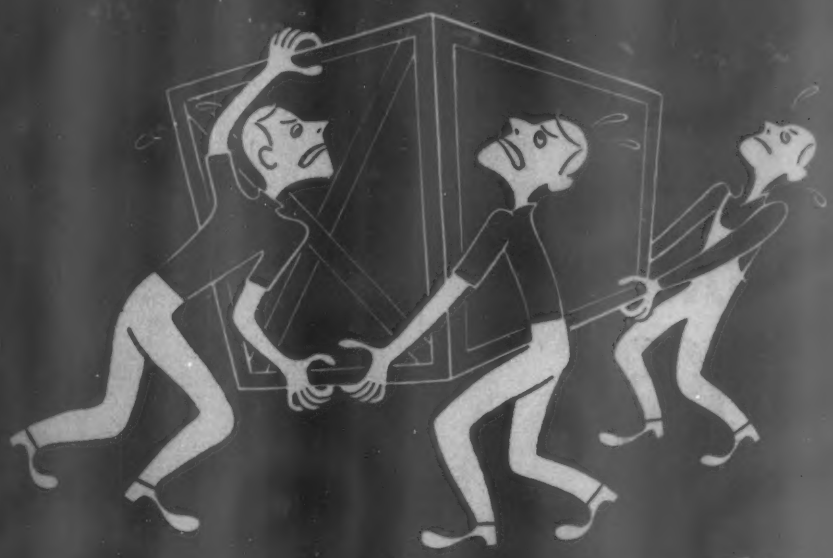
Thirty-three different styles and sizes of steel access doors are available, ready to install. They need no special framing, no cutting, alteration, or adjustments; they fit flush with the surface in which they are installed. Furnished with a prime coat of aluminum. Available in either hinged or removable (clip fastened) types. Locking device may be equipped with screw head or key lock. Inland Steel Products Co., Box 393, Milwaukee 1.

•

CENTRIFUGAL PUMP

Portable, self-powered Model FZZ centrifugal pumping unit measures 20 7/15 x 22 5/16 x 25⅛ inches. It is available with hand-carrying frame, a barrow-type carriage with pneumatic tires, or for stationary mounting. Capacity is 60 g.p.m. at 90-lb. pressure, and 150 g.p.m. at 30 pounds. Suitable for use as emergency fire equipment, high-pressure washing, pumping water from basements or excavations, emptying or filling tanks or tank cars and similar activity. Pump is bolted on a 7.7-hp. 4 cycle aircooled gasoline engine. May be used with either foam or water for firefighting. Can be carried by two men, wheeled by one, or mounted on any type of mobile

GET A TRUCK



A YALE TRUCK

Why use muscles to do your moving and lifting? One man and a Yale Worksaver Electric Truck can do the job easier, faster, safer . . . save you some real money. Capacities of Yale Worksavers run from 2,000 to 6,000 lbs.—7 styles.

See your local telephone directory for Yale representative or send for latest catalog—M-T. The Yale & Towne Mfg. Co., 4585 Tacony Street Philadelphia 24, Pa.

TOOLS THAT KEEP INDUSTRY "ON THE MOVE"

YALE

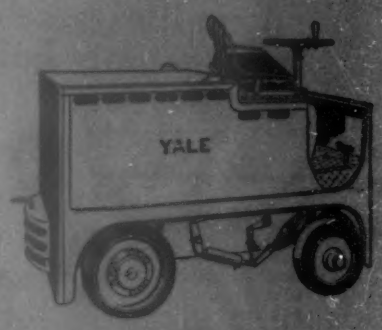
SCALES
HAND AND ELECTRIC HOISTS
HAND LIFT AND ELECTRIC TRUCKS

"ON THE MOVE" WITH YALE

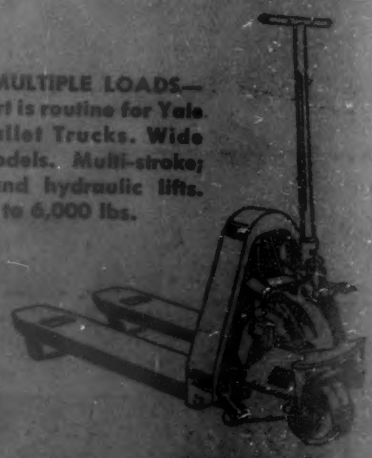
NEW LIGHTWEIGHT HOIST SPEEDY AND RUGGED—The Yale Load King Electric, newest addition to the largest line of hoists in the world, is portable and fast, yet can handle ¼ to 1 ton loads hour after hour without batting an eye. Lug, trolley and hook types.

YALE OFFERS NEW SCALE LINE—The Load Kings, for the weighing, counting, batching and testing of all kinds of materials. They cut weighing time, give you prolonged accuracy, lowest possible maintenance, increased scale life. With capacities up to 60,000 lbs. Yale Scales meet all industrial needs.

FOR LONG PULLS AND HEAVY LOADS—Inside your plant and out, the Yale Tractor, motive power for trailer trains, is a saver of both time and money. Complete line, with just the rated pulling power you need. Two and four wheel drives. Fixed or automatic couplers.



HANDLING MULTIPLE LOADS—with less effort is routine for Yale Hand Lift Pallet Trucks. Wide range of models. Multi-stroke; mechanical and hydraulic lifts. Capacities up to 6,000 lbs.



For Faster LIFTING
For Safer LOWERING

SIMPLEX
RATCHET LOWERING
JACKS

NO. 22
10-TON CAP.

For Contractors, Bridge and Road Builders, Truckers, Operators of Heavy Equipment

Use these single acting jacks for safe, sure work in lifting, lowering, pushing or pulling. Double lever sockets speed work in cramped quarters and in angular lifting. All models will lift full capacity on the toe or on the cap — a feature that only Simplex can give you.

Best materials are used throughout for rugged, long-life operation, by the manufacturer awarded the only gold medal for the safety of jacks by the American Museum of Safety.

SIMPLEX HYDRAULIC JACKS

For heavy duty work in shops ard factories, in construction and transportation. Powerful hydraulic operation. Available in eight models to handle from 3 to 100 tons —tested to 100% overload. Write for Bulletin HJ-47

Available in 10 models with capacities ranging from 5 to 20 tons, and lift from 7 to 18 inches. All have two-way standard lever socket except three largest models; these are available with any of three types of sockets. Delivered with lever included.

For full information, write for Bulletin: Industrial 48.

Simplex
LEVER - SCREW - HYDRAULIC
Jacks
TEMPLETON, KENLY & COMPANY
1018 South Central Avenue • Chicago 44, Illinois

equipment and operated while in motion. Hale Fire Pump Co., Conshohocken, Pa.

•

STEEL AND WOOD SHELVING

Line of shelving has upright members of steel, with hardwood steel-reinforced shelves. Placement of the shelves is adjustable by means of shelf clips and studs, which provide a vise-tight rigid, free-standing assembly, according to manufacturer. Lyon Metal Products, Aurora, Ill.

AIR CONVERSION UNITS

Designed to convert hand-operated arbor presses into air presses, conversion units can be installed by removing ram retainer plate and ram from the press, placing the air unit in the ram seat, replacing plate, and connecting unit to shop air line. Models are made to fit presses having rams of various sizes and shapes. Unit has a 4-in. I.D. cylinder, a 2½-in. stroke, a ¾-in. ram, and a power factor 12½ times that of the line pressure. Paragon Metal Products, 844 West Adams St., Chicago 7.

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PROTECTIVE COATING

Plastic coating, called Enthonite 101, is supplied as a viscous liquid containing 100 per cent solids. Manufacturer states that it contains no solvents to evaporate, which eliminates fire hazards. It may be applied by dipping, and cured by baking at temperatures of 250 deg. F. or more. One coat is sufficient when applied over a single primer coat of Enthonite Primer 208. It is suitable for coating racks, tanks, work holders, and anode holders, to protect them from inorganic chemicals. It may be

for finest . . . fastest $\frac{1}{4}$ inch drilling

ELECTRIC

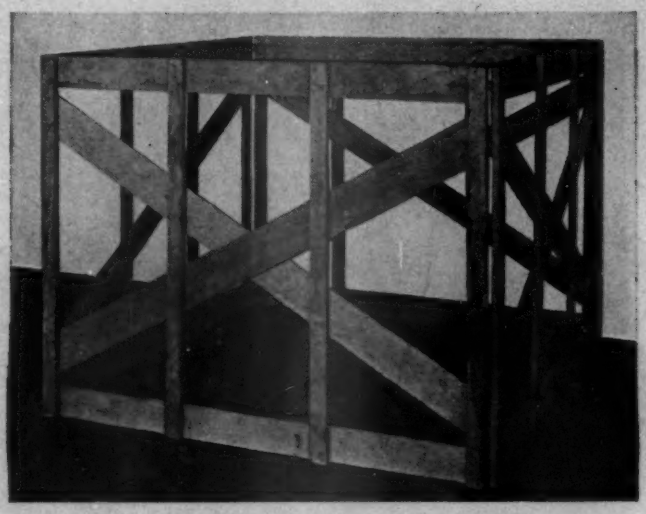
Tools

PNEUMATIC

a CRATE ... SURE

BUT, DOES IT DO THE JOB?

If it's a SARANAC *stapled* crate, your product gets the shipping protection that keeps customer complaints at a minimum. *Stapling* give crates extra strength because not *one* but *two* points pass through the slats and then hook-clinch back into the wood. One clinched staple holds as much as two clinched nails and the top part of the staple holds even *thin* slats that nail heads frequently pull through. Stapling enables you to use thinner crating stock without sacrificing strength—cuts material and shipping costs. SARANAC staplers cut and form staples to exact length, drive and clinch at a single stroke—up to 125 strokes per minute. Crate panels are completed in one pass—no turning of work at any time. Contact one of the Diagonal Slat Crate manufacturers listed. It's a good bet that he'll be able to recommend crating that will cut your shipping damages to a minimum and lower your crate costs substantially.



Manufacturers of Diagonal Slat Crates

Marathon Box Co.	Wausau, Wis.
Hotz Mfg. Co.	Shawano, Wis.
McNeil, Lauff & McNeil	Thomson, Ga.
General Box Co.	Chicago, Ill.
Chicago Mill & Lbr. Co.	Helena, Ark.
Kieckhefer Box & Lbr. Co.	Milwaukee, Wis.
Cozier Container Co.	Cleveland, Ohio
Moraine Box Co.	Dayton, Ohio

SARANAC MACHINE COMPANY
BENTON HARBOR • MICHIGAN

sprayed, brushed, or flow-coated on large areas, and baked with infrared lamps. Enthone, Inc., 442 Elm St., Dept. F, New Haven, Conn.

•

TESTER

Ultrasonic device, known as the Metroscope, measures wall thickness of metal, plastic, and glass parts where only one surface is accessible. It also makes rapid, non-destructive tests to detect flaws and imperfections. Manufacturer states that the performance of the device is not limited by accessibility. It can measure the wall thickness of a long tube, for instance, with less than 2 per cent error. An electronic oscillator is employed to generate electrical voltage, the frequency of which is varied throughout the tuning range of the oscillator. The point or points in this tuning range at which the part resonates are indicated. Suitable for use on brass, steel, nickel, copper, aluminum, magnesium, and lead, as well as glass and plastic. Photocon Research Products, 1062 North Allen Ave., Pasadena 7, Calif.

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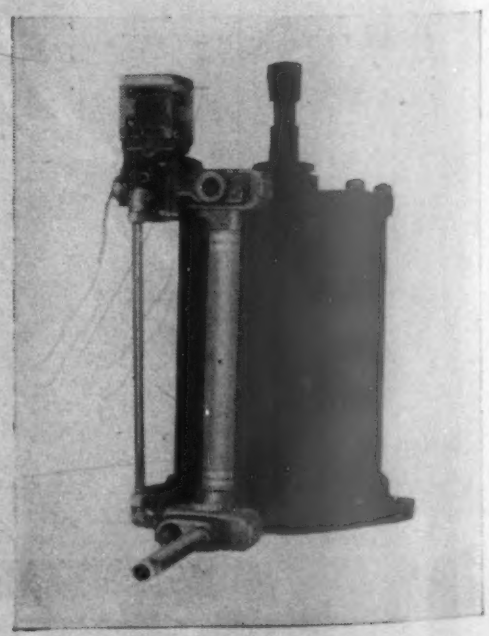


AIR CYLINDER VALVES

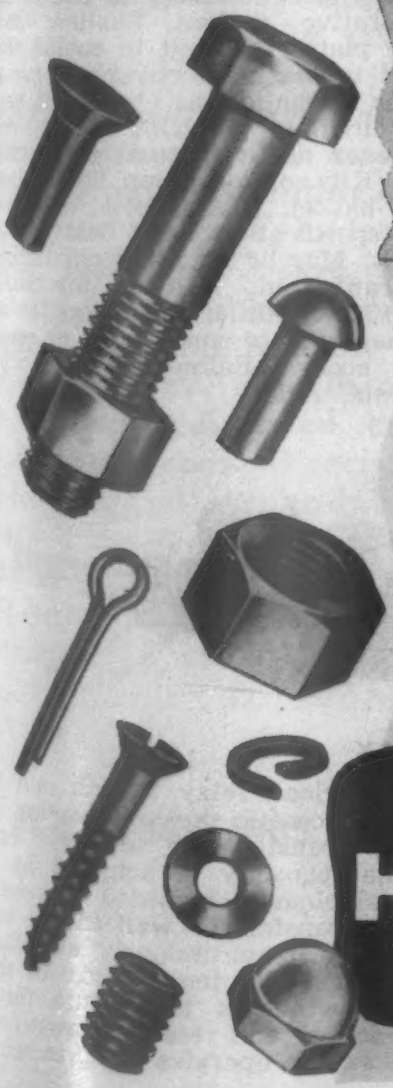
Individual units for the control of air cylinders consist of full-capacity three-way valves screwed directly into the pipe connections on the cylinder heads. This hook-up eliminates

It's Harper Everlasting Fastenings

10 TO 1 over common steel

1. Resistance to Rust and Corrosion
2. Resistance to High Temperatures
3. Non Magnetic
4. Non Sparking
5. Re-usable
6. Attractive Appearance
7. Easy to Clean
8. High Strength
9. Long Life
10. Lower Ultimate Cost

Common steel – lower first cost only



An amazing combination of advantages in favor of non-ferrous and stainless bolt and nut products . . . only lower first cost in favor of common steel.

PROMPT SHIPMENTS from STOCK

Bolts, Nuts, Screws, Washers, Rivets, Accessories . . . Harper maintains stocks of over 5,000 different items in Chicago and New York . . . large quantities of each. Others being added constantly. Specials made to order from ample stocks of raw materials. Write for catalog.

HARPER

THE H. M. HARPER COMPANY

2651 FLETCHER STREET • CHICAGO 18, ILLINOIS
585 WASHINGTON STREET • NEW YORK 14, N.Y.

Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Los Angeles, Miami, Milwaukee, Philadelphia, St. Louis, San Francisco, Seattle.

HARPER'S 25th Anniversary

To the Man Responsible for Protection Against Fire—

WITH fire losses mounting and replacement costs soaring to a new high, it's time to double check your fire-fighting equipment. Is every vital location covered, and by the right type of extinguisher? Have you enough extinguishers that no point is farther than 50 feet from a dependable extinguisher? Is every extinguisher freshly charged, ready for instant action?

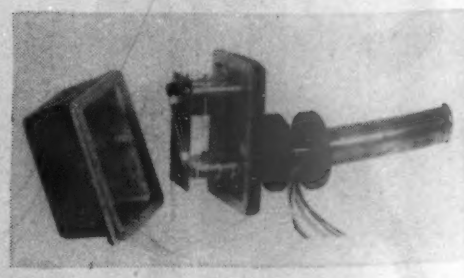
There is a size and type of Buffalo *better-built* Fire Extinguisher exactly suited to every class of fire hazard. There probably is a thoroughly trained Buffalo representative in your locality who will be glad to assist you in checking your fire-fighting equipment. . . . If he is not listed in your classified telephone directory, please write us direct.

BUFFALO FIRE APPLIANCE
CORPORATION
DAYTON 1, OHIO

all hose or pipe except the one for the supply and a small connector. Suitable for use with solenoid, combinations of double solenoid, hand, foot, cam, or sequence operation, of either old or new cylinders. Control can be at the cylinder or from a remote location, using ¼-in. tubing or hose from the operating station. Speed can be controlled by throttling at the individual exhausts. Available in ½-, ¾-, and 1-in. pipe sizes, with larger sizes furnished on request. Numatics, Milford, Mich.

PUMP

Recirculating pump and kit, called Oasis, is designed for large and small evaporative coolers. Shallow pan baffle plates are said to enable the pump to work effectively in sump depths as shallow as 1½ inches, and to recirculate available water over and over again through the cooler pads. Kits contain pump, float valve, filter basket, rubber hose, overflow pipe specifications, and installation details. May be used in recirculating lubricants in milling machines, lathes, and similar machinery, or as drainage where small leaks or seepages occur. Palmer Mfg. Corp., Phoenix, Ariz.



RELAY

Thermal load relay that is said to make automatic the safe loading of power transformers to their full thermal capacity is actuated by a bimetal element mounted in a well in the transformer wall in the top oil zone. It continuously evaluates the hottest-spot temperature of the copper windings to operate three snap-action self-resetting switches. First switch operates with increase

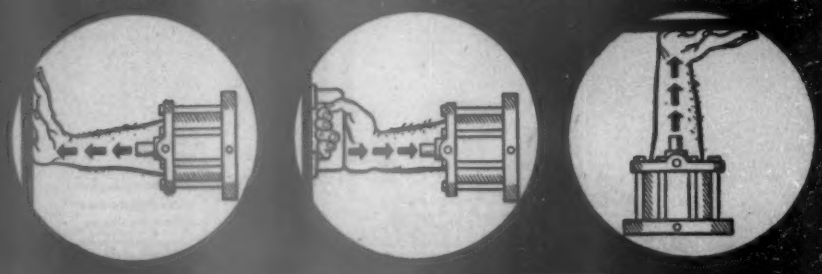
PERFECT CONTROL

More than a "muscle saver"—T-J Air and Hydraulic Cylinders give you *accurate automatic control* for operations of all kinds where pushing, pulling or lifting is needed.

Depend on T-J Cylinders to simplify machines . . . save time and labor . . . and do the job *right* at all times. Available in many standard sizes and styles . . . 100 lb. or 50,000 lb. . . . both cushioned and non-cushioned types. Precision-built with rugged dependability . . . backed by 31 years of know how. Write today for catalogs. The Tomkins-Johnson Co., Jackson, Mich.

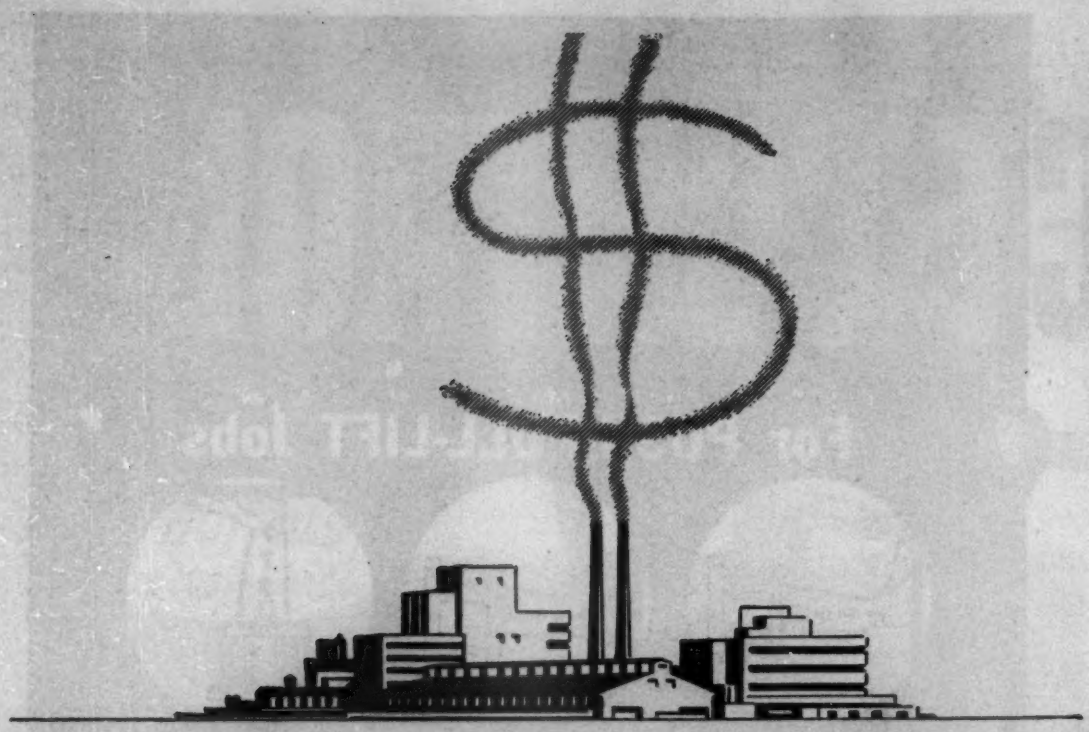
FOR TOUGH JOBS SPECIFY

For PUSH-PULL-LIFT Jobs



with T-J **CYLINDERS**

T-J
TOMKINS-JOHNSON
RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS



HOW AMERICAN INDUSTRY WAS HELPED TO INCREASED PROFITS LAST YEAR

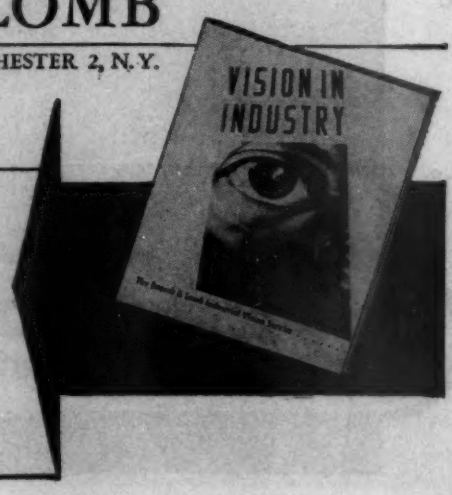
Many large industrial plants were helped to increase profits last year by the Bausch & Lomb Industrial Vision Service. This service positively demonstrated its value by reducing accidents, increasing production per worker, improving quality, decreasing training costs, lowering labor turnover and boosting employee morale.

The B&L Vision Program is the result of more than eight years of scientific research in industry. Research showed the direct relationship between employee job performance and specific visual skills . . . showed that every job has definite visual requirements which can be scientifically determined. Against these standards are compared the visual skills of present and prospective employees. Those failing to meet the standards may be helped by professional eye care, or may be transferred to departments or jobs where their vision is no longer a handicap and often an asset.

With competition becoming keener and cost again an important factor in marketing, every executive is doing his level best to strengthen the position of his company by utilizing cost cutting methods. B&L Industrial Vision Service will help your company lower costs and thereby increase profits. Look into this proved plan today.

BAUSCH & LOMB

OPTICAL COMPANY ROCHESTER 2, N.Y.



Industrial Vision Department
Bausch & Lomb Optical Co.
650-U St. Paul St., Rochester 2, N. Y.

Please send me a copy of "Vision in Industry" and details of the Bausch & Lomb Industrial Vision Service.

NAME .....

TITLE .....

COMPANY .....

STREET .....

CITY ..... STATE .....

of transformer load to start cooling fans. If load increases and approaches the safe thermal operating limit, second switch closes to give a warning. If load continues to increase until thermal limit is reached, third switch either trips the breaker or gives an alarm. Designed to protect from overloads of the operational type only, and will not function on short circuits unless other protective relays have failed to operate. Westinghouse Electric Corp., Box 858, Pittsburgh 30.

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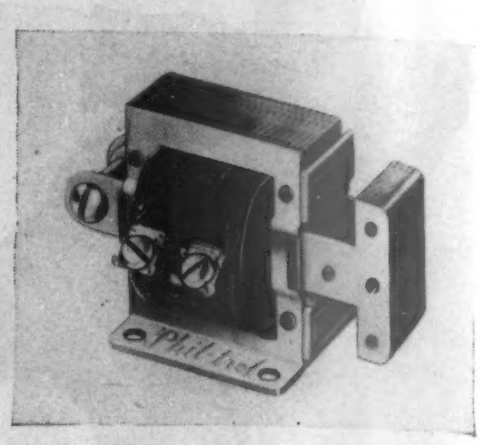

ACTUATOR

Featuring a frame of bonded silicon steel laminations, actuator 51A has a T-shaped laminated plunger adaptable for both push and pull operations. Available for continuous duty on 115 volts, 60-cycle current, with a maximum stroke of 1 inch. Nonmagnetic stainless steel side plates on the plunger and special brass plunger guides are installed on the inside of the frame. Over-all dimensions are 1½x1⅞x1-15/16 inches. Phillips Control Corp., 612 North Michigan Ave., Chicago 11.

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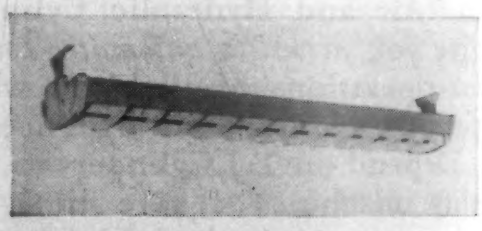

FLUORESCENT LUMINAIRE

Two-lamp fluorescent light, type CD-80, is available as a direct-indirect type with steel louvered bottom, or as a semi-indirect type with a translucent plastic bottom. Plastic side and bottom panels are polystyrene extrusions. Two lock springs at the ends of the luminaire, when released by finger action, allow removal of the plastic panels. Single and twin stem hangers are available for suspension mounting. Louvered units can be mounted on ceiling brackets when required. Starters and ballasts are accessible without removing lamps, Westinghouse Electric Corp., Box 868, Pittsburgh 30.

•

TEMPERATURE CONTROL

Temperature regulator combination has built-in thermometer on a clear 4½-in. dial. Change of ½ deg. F. causes a control to operate solenoid valve, actuating a valve which snaps open or shut to control steam supply. Fingertip temperature-setting

COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT

Mahon Finish Baking Oven Built Outside of the Plant Adjacent to the Building Housing the Remainder of a Complete Mahon Finishing System at the East Moline Plant of John Deere and Company. The Complete System includes a Six Stage Metal Cleaning and Rust Proofing Machine, Dry-off Oven, Hydro-Filter Spray Booths and the Finish Baking Oven Illustrated Above.

Interior of the Mahon Finish Baking Oven, Illustrated Above, Showing a John Deere Double Row Corn Picker Carried on a Continuous Overhead Trolley Conveyor.

Oven Installation Outside of Plant Saves Valuable Manufacturing Space!

In order to save valuable floor space inside of the plant, and to obtain an efficient oven design unhampered by restrictions normally encountered in planning ovens inside of industrial plants, this finish baking oven, which is part of a complete Mahon Finishing System, was installed outside, adjacent to the building housing the remainder of the system. This is another example of Mahon Planning and Mahon Engineering. When you are considering new finishing equipment, remember that in a Mahon system you get better planning, better engineering, and therefore a better finish at lower cost . . . because, twenty-seven years of experience, pioneering development, and constant research, in this highly specialized field, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon Insert in Sweet's Mechanical Industries File for complete information, or arrange consultation with Mahon engineers.

THE R. C. MAHON COMPANY

Home Office and Plant, Detroit 11, Mich. • Western Sales Division, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems including: Metal Cleaning Machines, Rust Proofing Machines, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Units, and Drying and Baking Ovens. Also Paint Reclaiming Units, Hydro-Foam Dust Collectors, and many other Units of Production Equipment.

MAHON

THEY SPECIFY *"Automatic" Sprinklers*
FOR **DEPENDABLE PROTECTION...**
IN THE EMPIRE STATE *and Everywhere*

FIRE can do only the damage you permit it to do. If it destroys your possessions, it is because those possessions are permitted to be food for flames, and there is really nothing at all mysterious about the process of combustion.

Scientists have expended considerable energy in their attempts to master fire, yet, at every hand stand ruins, evidence of their failure. Only protection from fire has been steadily advanced, and *"Automatic" Sprinklers* today stand as science's greatest contribution to the never ending battle against fire destruction.

The accomplishments of *"Automatic" Sprinkler*, during more than sixty years of fire protection pioneering, spell constant advancement and development. The results are best measured in terms of product dependability and service... substantial reason why *"Automatic" Sprinklers* figure more and more prominently as specified equipment for both old and new construction. *They're an important investment today... perhaps welcomed protection tomorrow.*

"Automatic" Sprinkler
FIRST IN FIRE PROTECTION
DEVELOPMENT · ENGINEERING MANUFACTURE · INSTALLATION
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
YOUNGSTOWN 1, OHIO
OFFICES IN PRINCIPAL CITIES OF NORTH and SOUTH AMERICA

changes can be made by turning a screw while control is in operation. Suitable for use wherever a sensitive control of steam valves is needed, or wherever temperatures are changed frequently. Sarco Co., Inc., 350 Fifth Ave., New York 1.

•

WATER COOLER

Combination electric water cooler and refrigerator has a vitreous china bubbler top and a refrigerated storage compartment. Called Aqua Refrigerette, it is an automatic pressure-type cooler, designed to be connected to the building water and waste lines. The 2-cu.-ft. refrigerated compartment is of stainless steel, is equipped with a lock, and contains two 14-cube ice trays. Puro Filter Corp. of America, 440 Lafayette St., New York 3.

•

AIR CIRCULATORS

Line of air circulators in 24- and 30-in. sizes is available with four styles of mounting accessories, including floor column, counter column, ceiling, and wall bracket. They offer a 98-deg. range of adjustment, have 2-speed, ball-bearing capacitor motors, aluminum blades. The 24-in. model delivers 5000 and the 30-in. fan 6500 c.f.m. The Emerson Electric Mfg. Co., St. Louis 21.

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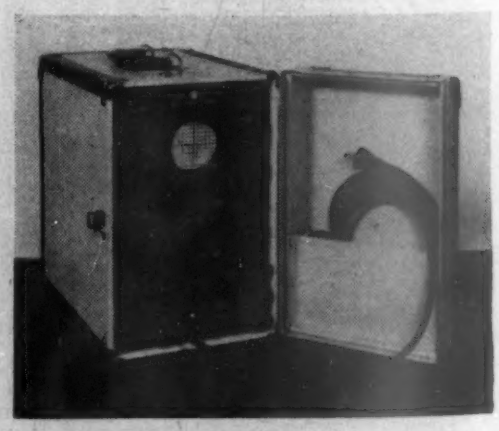

OSCILLOSCOPE

Designed for service applications in the field of industrial electronics, Type YNA-4 oscilloscope is intended for servicing such equipments as resistance welders, motor control circuits, power supplies, and photoelectric circuits. It has a 3-in. tube,

WASTE DESTRUCTIVE HEAT!

SAVE PRODUCTION TIME!

HARRISON OIL COOLERS
FOR
INDUSTRIAL APPLICATIONS

Engineers recognize the need of *wasting* heat, as well as *utilizing* heat. Harrison Oil Coolers *waste* heat efficiently, thus insuring uninterrupted production, and lengthening machine life. Consult Harrison engineers.

HARRISON

HARRISON RADIATOR DIVISION OF **GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.**

Slippery?

● Smooth plant floors can become slippery as an eel. Grease and water can make a smooth floor treacherous underfoot . . . and accidents cost money.

Where sure footing is essential install U·S·S Multigrip Floor Plate. Multigrip's evenly-spaced risers provide skid resistance and traction in all directions. Whether floors are wet or dry, Multigrip Floor Plate reduces accidents due to slipping and falling.

Multigrip is safe, durable, economical —installations are permanent, reducing plant maintenance costs.

Get further information about Multigrip from your nearest steel warehouse or write to us direct.

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
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8-538

UNITED STATES STEEL

with sufficient sensitivity to expand the trace to several times the tube size; push-pull d.c. amplifiers of high sensitivity; high and low impedance vertical input with step and continuous attenuation to handle wide range of signal input. The horizontal sweep ranges from 10 cycles to 20 kilocycles per second, and an insulated case and panel permit operation up to 550 volts above ground. The device weighs about 25 pounds, and has a removable front cover and leather carrying handle. General Electric, Specialty Div., Electronics Park, Syracuse, N. Y.

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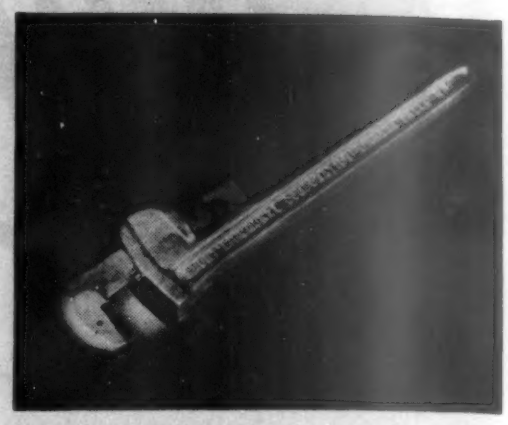

PIPE WRENCH

Lightweight aluminum pipe wrench weighs less than half as much as a steel wrench of the same size, according to the manufacturer. Tests have shown that the 18-in. wrench will withstand pressures of 13,500 inch-pounds, the equivalent of 900 pounds of load pressure applied 15 inches from the wrench jaws. Manufactured in sizes of 14, 18, 24, 36, and 48 inches, and guaranteed against breakage in normal use. Frontier Bronze Corp., 4480 Packard Rd., Niagara Falls, N. Y.

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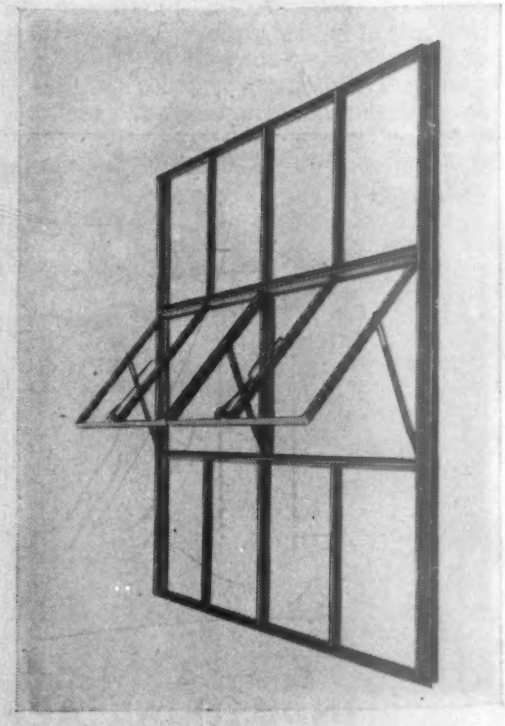
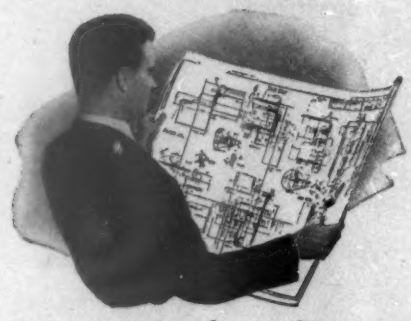


STEEL WINDOW

Twin vents at the center panel are featured in steel window designed for installation in either frame or masonry. It measures 64½ x 63 5/16 inches over-all, and is constructed of arc-welded hot-rolled sections. Vertical mullion bars are available for

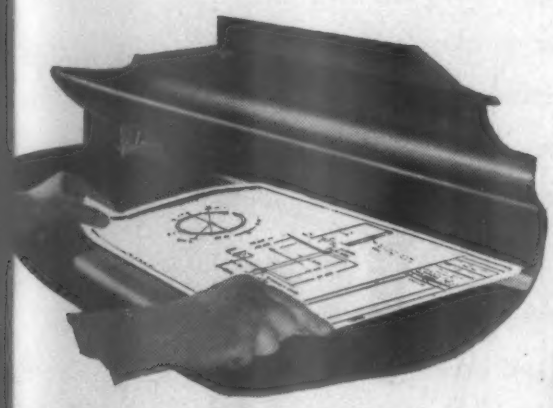
This new photographic paper gives you top-quality intermediates at low cost

It gives you everything—for intermediates and second originals—in *one* paper . . . With this one paper—Kodagraph Autopositive—you get everything you want. Here is a paper that gives you brilliant, black-on-white intermediates or second originals. A paper that gives sharp, clear reproductions of opaque drawings, faded originals, blueprints or direct process prints, weak-line "unprintable" pencil tracings. A paper that assures better-than-ever shop-prints. A paper that's tough, long-lasting, non-curling . . . that permits quick, easy deletions and changes.



It gives original quality—and better . . . Kodagraph Autopositive Paper has the unique ability to give contrast above that of the original—to reproduce pencil drawings, for example, to ink-line density without loss of detail. That's because it's a silver-sensitized photographic paper.

Kodagraph Autopositive Paper



It saves time and money . . . It's truly economical to use. It reproduces directly-to-a-positive in ordinary room light on familiar direct process or blueprint equipment. Simple photographic processing . . . no darkroom is needed . . . no expensive, time-consuming negative step. Extra-thin, evenly translucent for sharp, clear shop-prints—in a hurry.

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Specify . . . it will pay you . . . Your own reproduction department can make intermediates for you on Kodagraph Autopositive Paper. Or your local blueprint service will be glad to do the job and to make direct process prints or blueprints from the intermediates, if you wish. Be sure—though—to specify the new Kodagraph Autopositive Paper. Write for details.

Mail coupon for FREE booklet

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Eastman Kodak Company
Industrial Photographic Division
Rochester 4, N. Y.

Please send me a copy of "The Big New Plus"—your booklet about Kodagraph Autopositive Paper and the other papers in the Kodak line. I have
☐ direct process ☐ blueprint ☐ contact printing equipment.

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Company _____
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State _____

Kodak

"KEX" Industrial Wiping TOWELS

New Atlanta Ford Plant Joins Ranks of "KEX" Users

THIS is the latest of the many Ford Motor Company plants to select KEX Industrial Wiping Towels because they work so efficiently at low cost.

"KEX" National Service is available for all types of industry in every section of the country. This service consists of a simple, quick and logical way to rent industrial wiping towels of uniform quality—made for the use to which you put them.

They are delivered in any quantity to suit the individual requirements of your plant . . . and are exchanged at regular intervals to insure an adequate supply of clean towels. They come in neat, easily handled bundles that help control distribution. Every towel is thoroughly cleaned and inspected before delivery.

Follow the lead of industrial leaders who overlook no opportunity to keep operating costs down—and efficiency up!

Nothing to Buy—No Expensive Inventory—Just a Low Monthly Rental. The first month should show a decided saving on wiping costs.

For complete information, see your classified Telephone Directory for nearest KEX distributor, or write KEX NATIONAL SERVICE, 295 Fifth Avenue, New York 16, N.Y.

"KEX" NATIONAL SERVICE

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group combinations; screens also may be obtained. Kewanee Mfg. Co., Kewanee, Ill.

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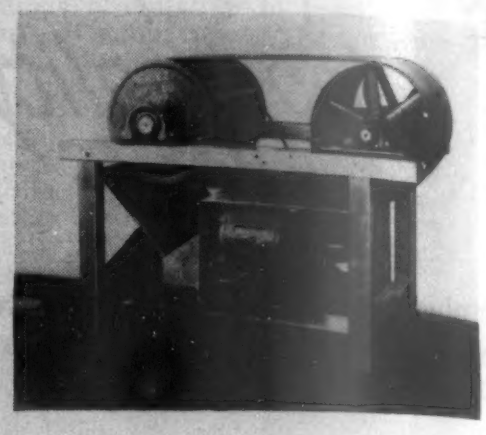

MAGNETIC SEPARATOR

Portable magnetic pulley, known as the Puri-Pulley, is non-electric, and was developed to remove fine iron or less magnetic particles and to separate ferrous from non-ferrous material, ranging in size from 10 to 200 mesh. Strength is concentrated close to the face plate. Narrow air-gaps and increased number of pole plates are said to provide an effective cleaning surface. Available in 18- and 24-in. diameters, and in belt widths from 12 to 60 inches. Eriez Mfg. Co., 170 East 12th St., Erie, Pa.

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ALUMINUM NAILS

Six types and 16 different sizes of aluminum nails, suitable for use with many types of building materials, are said to weigh only one-third as much as steel nails. Line includes common, roofing, plaster board, shingle, and felt paper nails, all of which are etched to increase their holding power. Reynolds Metals Co., 2500 South 3rd St., Louisville.

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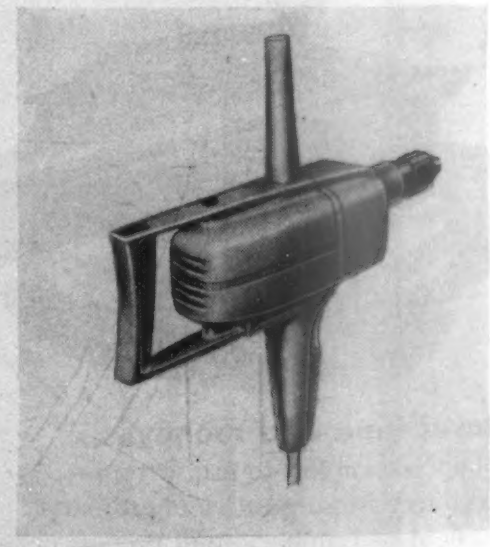


ELECTRIC DRILL

Portable ½-in. electric drill, Model 500, has a balanced armature, a.c.-d.c. motor, blower-type fan for cooling. Housing and handles are of aluminum alloy; side handles may be removed for close-quarter drilling. The drill is supplied with a three-wire rubber-covered cable and attachment plug, Jacobs hex key chuck, and Cutler-Hammer trigger

OW, GREASES THAT RESIST
OTH HEAT AND WATER

WERE YOU ever faced with the problem of lubricating bearings which operated under extremely wet conditions and, at the same time, were subjected to widely varying temperatures? If so, you probably had to choose between a high-temperature grease with poor resistance to water or a water-resistant lubricant with only fair resistance to heat.

Standard Oil's new Stanolith greases end all need for compromise. A lithium soap grease has unusual characteristics which conventional soda soap or lime soap greases cannot duplicate. Stanolith greases resist the washing action of water because they are insoluble in water and also are extremely adhesive. They resist heat because they are made from an extremely stable base oil and a high-melting point soap, and contain an oxidation inhibitor.

Where you have a heat-and-water problem or where costly machines demand the best possible lubrication, try Stanolith. A Standard Oil Lubrication Engineer will help to make a test. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

Performance Characteristics of Stanolith Greases

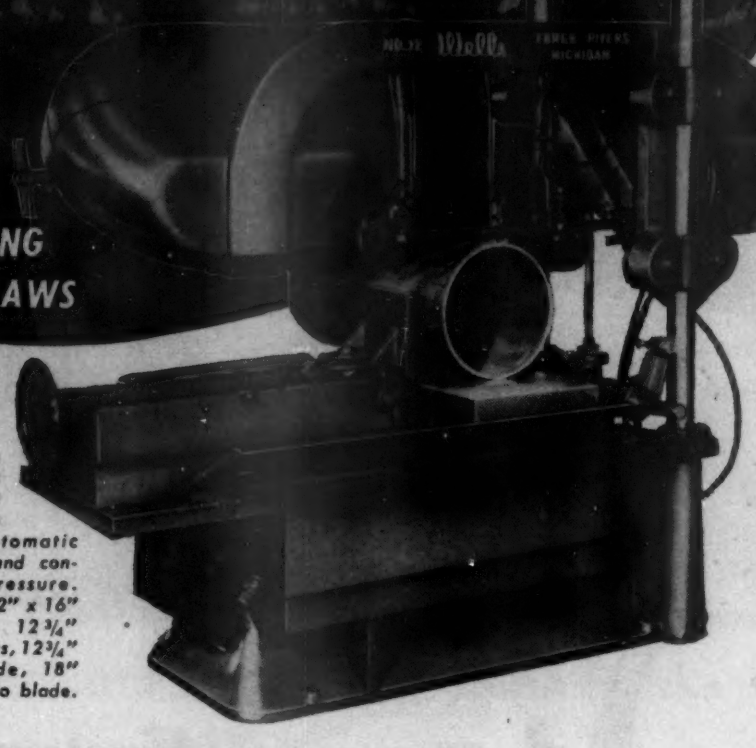
- operate over a wide range of temperatures—have high dropping points.
- have excellent water resistance.
- have unusual mechanical stability—a minimum of oil evaporation and separation.
- contain effective oxidation inhibitors.
- are corrosion resistant.

Two grades of Stanolith Greases are available: No. 42—with a No. 1 consistency, and No. 57—with a No. 2 consistency.

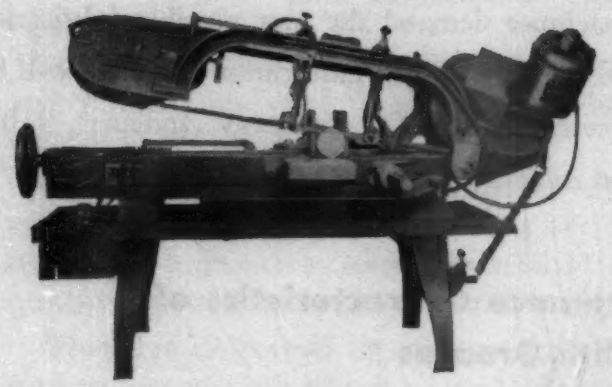
TANDARD OIL COMPANY (INDIANA) STANDARD

Now YOU CAN HAVE THE ADVANTAGES OF WET CUTTING

. . . with either of these popular WELLS METAL CUTTING BAND SAWS



Right — The heavy duty Wells No. 12 with wet cutting system features an automatic cutting cycle and controlled blade pressure. Capacity is 12" x 16" rectangular; 12¾" rounds; die blocks, 12¾" deep, 16" wide, 18" clearance, bed to blade.



Left—The versatile Wells No. 8 with wet cutting system. Suitable for production or general utility. Capacity is 8" x 16" rectangular (5" x 24" with special guides); 8" rounds.

Both the No. 8 and the new No. 12 Wells Metal Cutting Band Saws are now offered with complete, self-contained Wells wet cutting systems. Experience gained through wide use of this system on the No. 8 saw has proven that it will pay for itself quickly thru production cost reductions. Controlled flow of liquid into cutting area increases blade efficiency and permits safe use of higher f.p.m. cutting speeds. Get full details on this economical extra today and ask about a wet cutting system for your present No. 8 or No. 12 Wells Saw.

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1414 TAYLOR ST., THREE RIVERS, MICHIGAN

switch. Capacity in steel, ½ inch; in hardwood, 1 inch. Wood augers up to ⅞ inch; hole saws up to 2½ inches. Portable Electric Tools, Inc., 255-59 West 79th St., Chicago 20.

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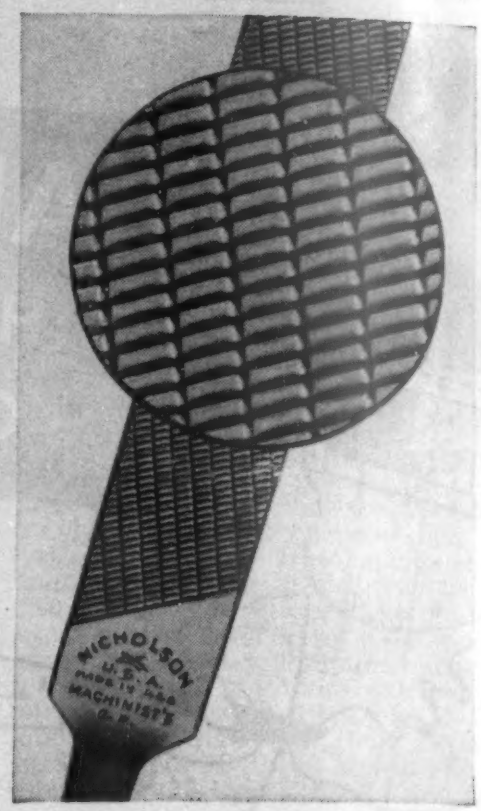

MACHINIST'S FILE

Designed for use on aluminum, bronze, cast and malleable iron, mild and annealed steel, machinist's general purpose file has single cut teeth divided by angular serrations into short cutting edges which are said to remove stock rapidly and still leave a smooth finish. Available in 8-, 10-, 12-, and 14-in. lengths. Nicholson File Co., Providence 1, R. I.

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FLOORING

Mineral-coated fabric with pressure-sensitive adhesive, called Type B Safety-Walk Wetordry Nonslip Surfacing, consists of hard mineral grains surface-coated to a heavy treated fabric, to the back of which has been applied tacky adhesive covered by a protective cloth liner. Furnished in 96-ft. rolls, cleats, and strips, in black, red, green, and silver, in tile design. Manufacturer claims that it is shatterproof, gasoline, oil, and waterproof. Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.

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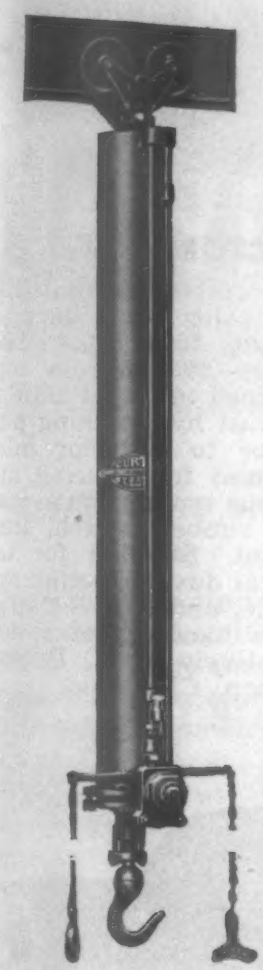
POWER TRUCK

Combining a low-lift platform and a crane, power truck can pick up a load from floor level and lift it to a hook height of 8 feet, within a radius of 45 degrees either left or right from base. It may be used for reaching, high-stacking, or taking down raw materials or finished products in any form that may be handled with rope or cable slings. Platform can lift and transport loads weighing up to 3 to 5 tons, depending on size and model. Loads may be piled directly on truck's platform or on skids under which the platform can maneuver after loading. Crane and platform

Get More Production Per Man with . . .

CURTIS AIR HOISTS



The speed, ease of handling and accurate control of Curtis air-powered Hoists and Cylinders step up production.

Wherever a lifting, pulling or pushing operation is involved, CURTIS Air Hoists save time and labor; cut load-handling costs.

Curtis Air Hoists provide:

- Low original cost
- One-man operation
- Immunity to abuse by overloading
- Capacities to 10 tons
- Light weight
- Lowest operating expense
- Finger-tip control
- Pendant, bracketed or rope-compounded types

Send for Bulletin C-7 on Curtis Air Hoists, Air Cylinders and Air Compressors.

CURTIS

PNEUMATIC MACHINERY DIVISION

of Curtis Manufacturing Company

1995 Kienlen Avenue • • St. Louis 20, Missouri

94 Years of Precision Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION *of Curtis Manufacturing Company* H-594
1995 Kienlen Avenue, St. Louis 20, Missouri

Please send me Form C-7 on Curtis Air Hoists, Air Cylinders and Curtis Air Compressors.

Name.....

Firm.....

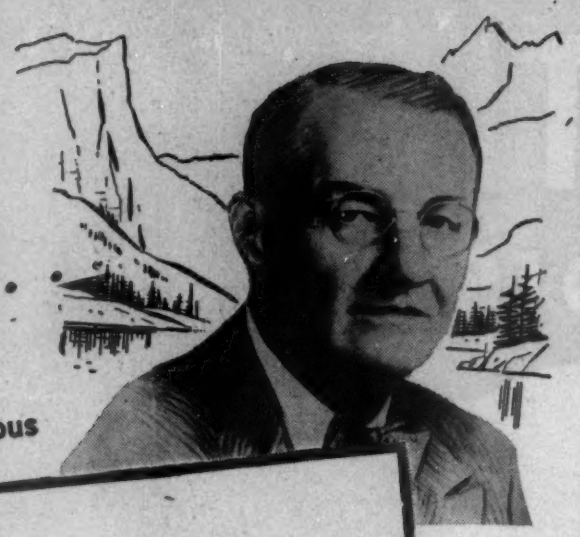
Address.....

City.....Zone.....State.....

UNION PACIFIC

The Governor of Colorado

Invites you.



Lee Knous

THE STATE OF COLORADO
EXECUTIVE CHAMBERS
DENVER

WILLIAM LEE KNOUS
GOVERNOR

To American Industry:

Look long at Colorado.

A vigorous, young state, awake to its opportunities yet aware of its needs, will challenge your attention and stimulate your imagination.

Natural resources we have in abundance with the water and power for their development. Our labor force is highly adaptable, our markets are rapidly expanding.

Our health-giving climate, our scenic setting make Colorado a soul-satisfying home for you and your families.

And most important — we know where we're going! Our leaders in business, industry, agriculture and education, through their Resources Development Council, are charting a course toward a sound, stable future for our people.

Look long at Colorado — it offers you much!

Lee Knous
Governor

★*One of a series of advertisements based on industrial opportunities in the eleven states served by Union Pacific Railroad.*

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

★Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

are operated independently, so that the crane may be used by itself at any point. The 8-ft. boom is of box girder construction. The crane's load lifting capacities range from 1000 to 2000 pounds, depending on the model. Elwell-Parker Electric Company, Cleveland.

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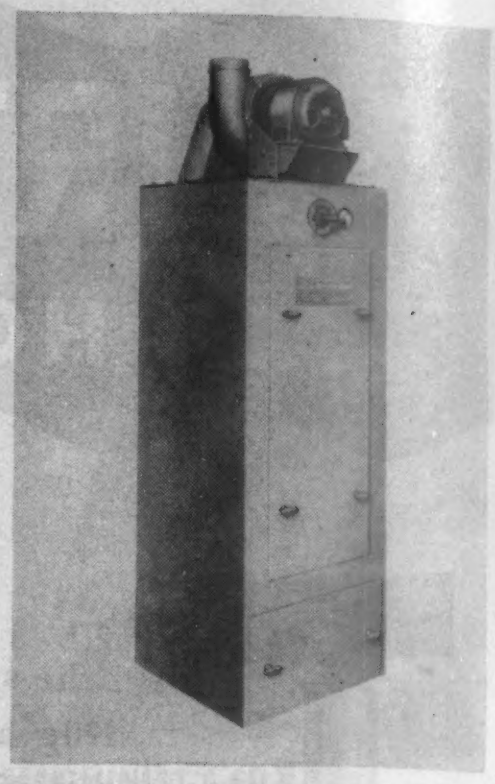

DUST COLLECTORS

Line of small, portable, self-contained dust collectors, called Gem, have air capacities ranging from 550 to 1350 c.f.m. They are available in four sizes, and designed to be set close to the source of dust by attaching pipe or flexible tube to collector inlet. May also be used for filtering and collecting various types of dust, such as silica, talc, rubber, starch, iron, feldspar, cement. Suitable for use where no central dust collecting system is available, and where the air volume for the handling of a dust problem is relatively small. Parsons Engineering Corp., Cleveland.

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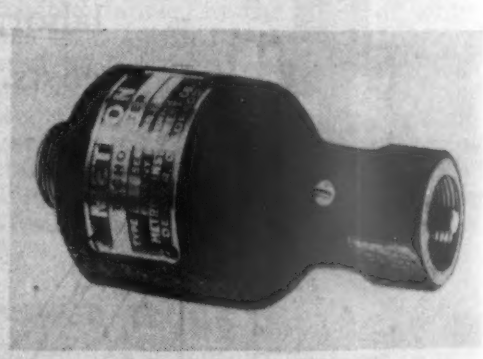
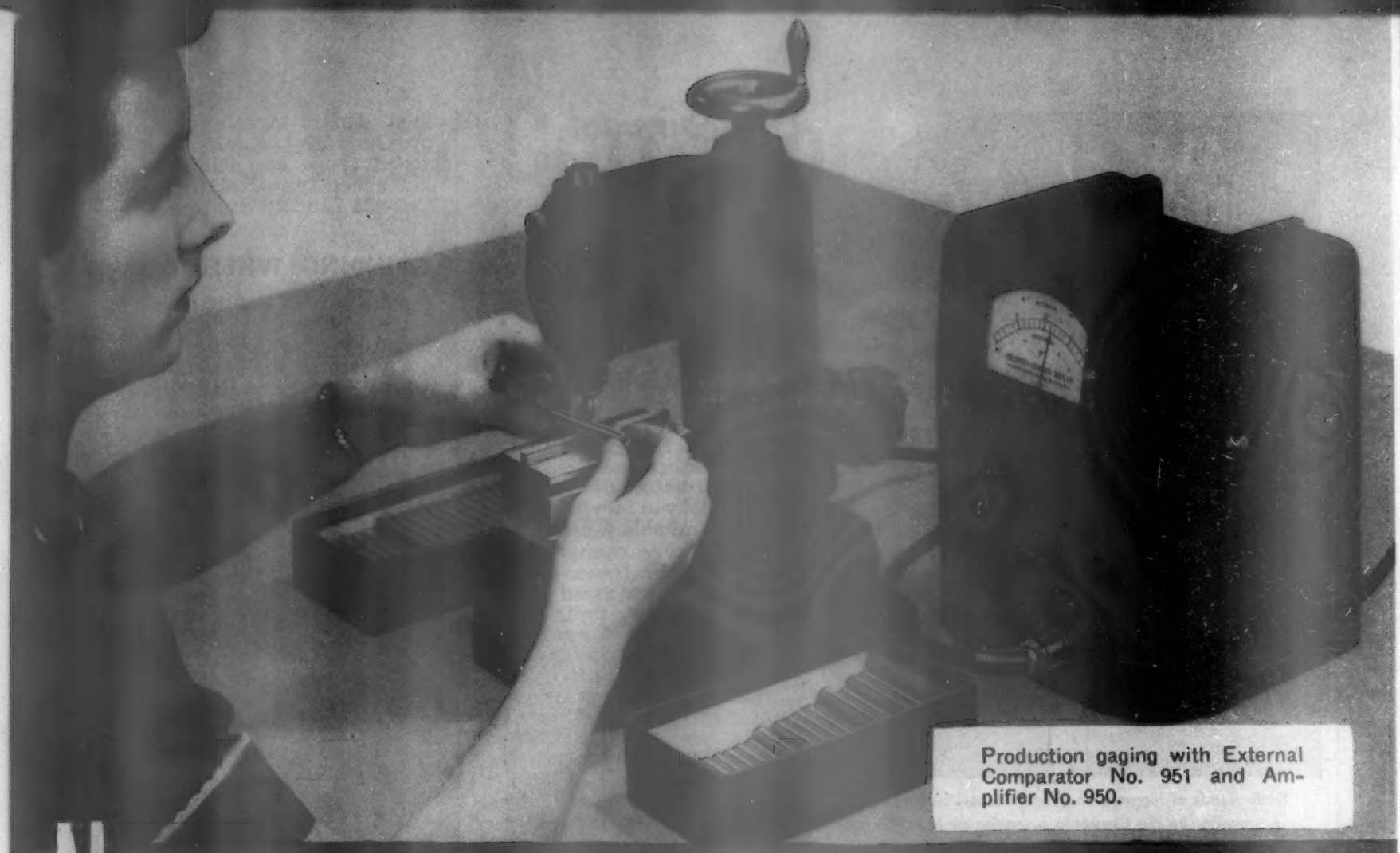


TACHOMETER HEAD

Small, lightweight tachometer head, Type 54, is suitable for use with tachometer indicators to give full scale readings as low as 200 or as high as 10,000 r.p.m. The device weighs 10 ounces, is 2⅛ inches in diameter and 4⅜ inches long, is sealed, and said to be unaffected by vibration, magnetic fields, or temperature variations. Operating on a contact principle, it contains no gears, magnets, or brushes. Mounted in permanently lubricated ball bear-



Production gaging with External Comparator No. 951 and Amplifier No. 950.

NEW! *Electronic* [illegible]

... by Brown & Sharpe

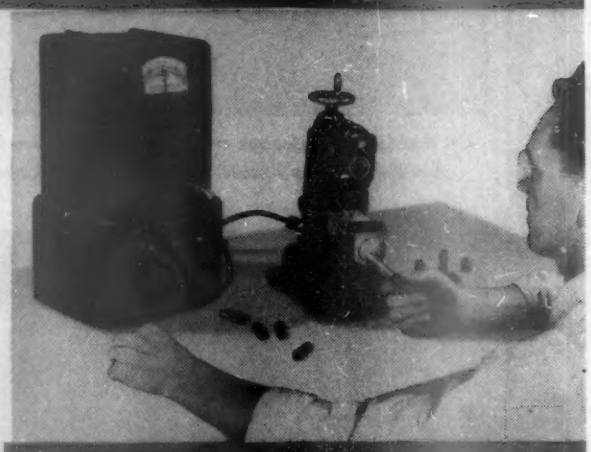
● EXTERNAL ● INTERNAL

Precision gaging on a mass-production scale is now both practical and economical for any plant or laboratory! The new Brown & Sharpe Electronic Measuring Equipment applies electronic super-sensitivity to measurement, and electronically amplifies the results for instant, accurate reading on a large calibrated dial. It enables accurate gaging to .00001", as fast as test-pieces can be handled.

An outstanding advantage of this new Electronic Measuring Equipment is the separate amplifier unit, which isolates heat-producing elements and prevents temperature drift in gaging units. Another unique feature is the true linear response of the gaging units, which permits accurate setting for the entire scale with only one gage block or master. These are only two of *many* advantages.

Get the full story of this versatile new Electronic Measuring Equipment. Write for details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

We urge buying through the Distributor



Speedy internal gaging with Internal Comparator Attachment No. 952, Amplifier No. 950 and Signal Light Attachment No. 958 (optional).

Gage Head Cartridge No. 953 is shown mounted in special fixture for linear gaging.

BROWN & SHARPE B·S

MATERIAL HANDLING News

This compact package of pulling power "delivers the goods," at low cost The CLARKAT

Trailer-loads of luggage, mail and express are hauled swiftly by the Clarkat to a waiting air liner.

On their way to storage a Clarkat hauls trailers loaded with castings, machined parts, drums and miscellaneous items.

Mass handling of palletized units on trailers is an easy, natural job for the Clarkat.

Thorough, thoughtful analysis of performance records of towing tractors used in Industry leads you inevitably to the husky, nimble Clarkat.

Hauling huge tonnages of material by the trailer-train-load—using its squared nose to bulldoze heavy units into position—handling the numerous heavy-pull jobs common to most busy plants: the Clarkat has made an extraordinary record for efficient and economical performance wherever it has been put in service.

Only an experience like Clark's—30-odd years of resourcefulness in evolving modern materials handling methods and machines—could produce the Clarkat.

Exceedingly important is the exclusive and flexible center-pivoted suspension of the full-width steering axle—a guarantee of smooth, safe travel over rough surfaces. It's easy to handle, easy on the driver, easy to steer.

It is built in two models:

- Clarkat "20"—drawbar pull 2000 pounds, towing capacity 42 tons
- Clarkat "26"—drawbar pull 2600 pounds, towing capacity 58 tons

It is gas-powered, with either solid or pneumatic tires. For still heavier hauling the Clarktor "6" is recommended; built in four models with towing capacities of 47, 68, 90 and 104 tons respectively.

A knowledge of this husky, hustling worker rates high as vital business information. To explore how it will speed up your production with substantial savings, get the objective survey and recommendation of a Clark field representative.

It's always "good business" to CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIV., CLARK EQUIPMENT COMPANY BATTLE CREEK 12, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

ings. Operating torque is low, approximately 1/20 ounce-inch for high speed types and ⅛ ounce-inch for low speed types. Metron Instrument Co., 432 Lincoln St., Denver 9.

•

GRINDING WHEEL DRESSER

Consisting of a balanced cutting wheel held and locked in heavy metal housing to deflect the particles away from the operator grinding wheel dresser called Tru-Dress, is mounted on hardened steel bearings. Available with 3- and 4-in. cutting wheels, the latter for use on larger grinding wheels, and provided with a partially removable handle which leaves a straight tool post shank for clamping in the tool holder of a cylindrical grinder. Crown Industrial Products Co., 1525 East 53rd St., Chicago.

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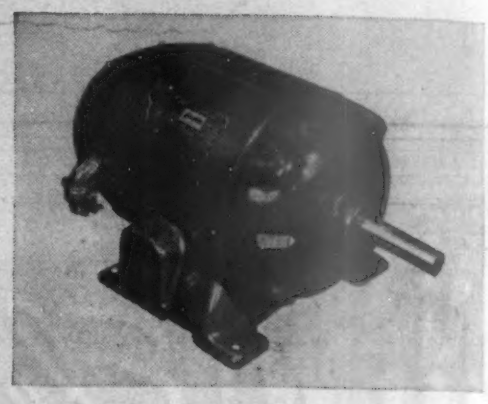

ELECTRIC MOTORS

Line of capacitor start, induction electric motors for heavy duty is available in single-phase at 1, 1½, and 2 horsepower, and in 3-phase at 1, 1½, 2, and 4 horsepower, both 60 cycle, 110/220 volts at 1750 r.p.m. Features include aluminum alloy housing and bell ends; prelubricated and sealed ball bearings that permit mounting in any position; stators that are dual voltage wound. Temperature rise is said to be only 40 deg. C; overload of 100 per cent. Rotation is electrically reversible by a switch, and frame is drip-proof. King-Wise, Inc., Archbold, Ohio.

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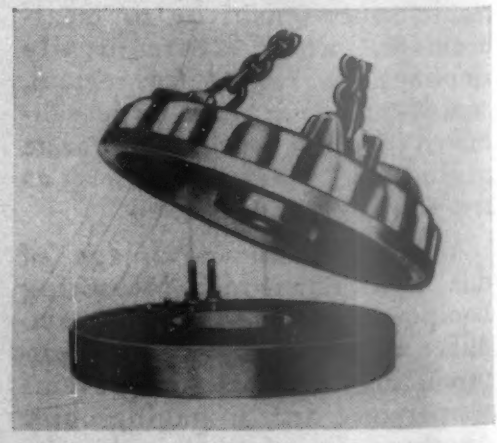
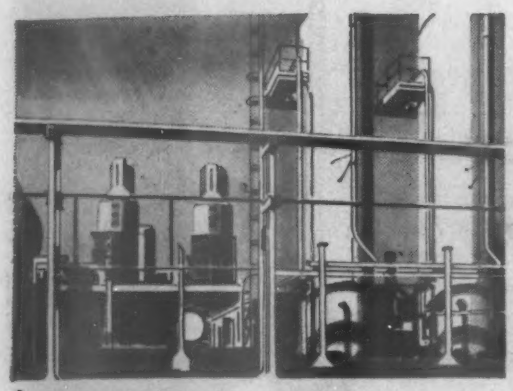


LIFTING MAGNET

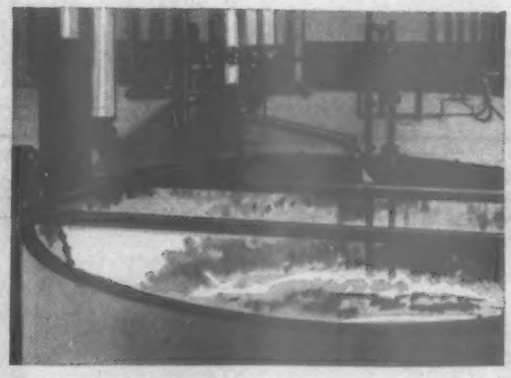
Lifting magnet, available in 45-, 55-, and 65-in. sizes, has the coil encased in a welded metal capsule from which all moisture has been removed by a vacuum process prior to impregnating the coil with insulating compound under pressure. This capsule-coil can be removed when

Are Your Corrosion Problems As Severe As These?

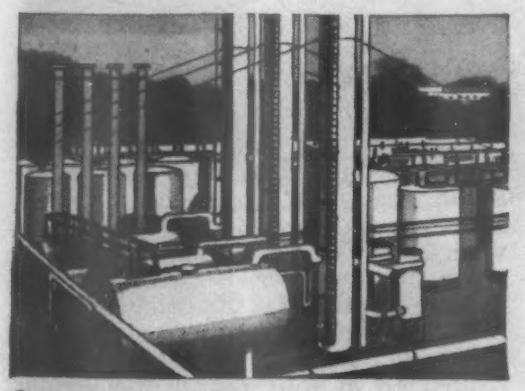
You won't be discouraged by any corrosion problem, when you read how these four companies have finally controlled extremely severe corrosion in their plants with a system of UCILON Protective Coatings!



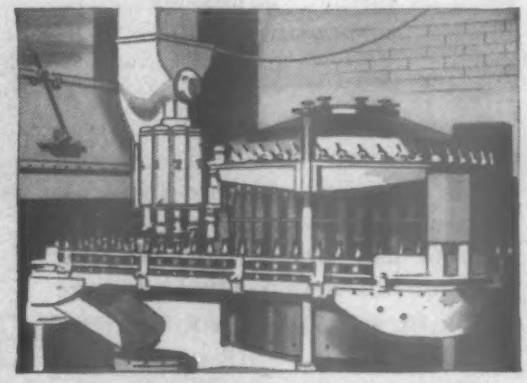
1. A WELL KNOWN REFINERY had Ucilon coatings applied to ducts exhausting oil and gasoline fumes at the cracking tower. One year after application, there was still not a sign of failure, despite the severity of the service.



2. A SOAP PLANT had a tough ceiling maintenance problem—some ordinary paints being destroyed by fatty acid vapors in as little as 2 weeks. Yet after *6 months* of exposure, Ucilon coatings were still totally unaffected!



3. A CHEMICAL PROCESSOR coated a steel storage tank with a Ucilon coating system. Especially hard on protective coatings, the tank's contents broke down two other coatings tried —one in 6 weeks. Yet Ucilon is still in good condition after *14 months!*



4. IN THE BOTTLING ROOM of one company, painting of machines was considered to be almost useless—until they discovered Ucilon. Nothing ever tried even approaches the effectiveness of Ucilon, which for *2 years* has been withstanding the humidity and spillage!

UCILON* 400

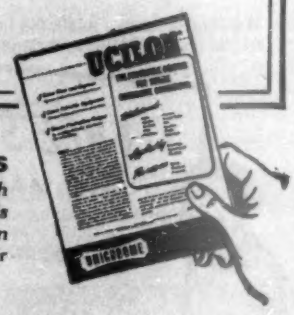
Ucilon 400 is a flexible, glossy, air-drying coating for metal, concrete and wood. It is applied by brushing or spraying. When solvents evaporate, a tough "plastic" film is formed. Ucilon 400 provides exceptional resistance to acids, alkalies, alcohols, oils and greases, salts, water, cleaning compounds, oxidizing agents.

OTHER UCILON COATINGS

Ucilon 1601—a ready-mixed, extra-bright aluminum paint with exceptional outdoor resistance. It stays bright under prolonged exposure, withstands elevated temperatures.

•

Ucilon 1501—a very hard, chip-resistant baking coating which resists chemical attack at temperatures higher than recommended for Ucilon 400.



SEND FOR THIS BULLETIN *which gives more details on various Ucilon coatings and their properties.*

Similar reports continue to arrive from plants of every nature. Maintenance men are discovering a degree of corrosion protection and service life they never achieved with any coating tried before. If *you* have an exceptionally tough coating problem, we're confident that there's a Ucilon coating system to help you stop corrosion damage and vastly lengthen the period between your paint jobs. Let us send you our specific recommendations without obligation. Write today, outlining the details of your application.

*Trade Mark Reg. U. S. Pat. Off.

UCILON Protective Coatings

UNICHROME products of UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N. Y. • Detroit 7, Mich. • Waterbury 90, Conn. • Chicago 4, Ill. • Dayton 2, Ohio • Los Angeles 13, Cal.

OUT OUR WAY
HELP HIM THERE--I'LL GET TH'--A STRETCHER--NO, I MEAN--I'LL GET SOMETHING!
FUNNIEST FALL I EVER SEEN--BOY, I FEEL SORRY FOR TH' POOR SWEEPER!
YES, SIR! FIRST TIME HE FORGOT TO PUT DOWN SOL-SPEEDI-DRI--AND LOOK WHAT HAPPENED!
THE FALL OF THE YEAR
J.R.WILLIAMS
T. M. REG. U. S. PAT. OFF.
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Quality makes SOL-SPEEDI-DRI the leader

SOL-SPEEDI-DRI is industry's No. 1 absorbent for all liquids. Spread over dangerous, oil-soaked floors, it provides a slip-proof carpet—cuts down on accidents caused by slips and falls. More SOL-SPEEDI-DRI is used in plants and shops all over the country than any other product of similar nature. The reason? There are many, but the big one is *quality*—constant, unvarying quality from one pound of SOL-SPEEDI-DRI to the next.

SOL-SPEEDI-DRI is mined and processed by people who are specialists in the business. Only nature's finest product is used, and this raw material is processed under stringent laboratory control into the finished product. SOL-SPEEDI-DRI comes to you in special weather-proofed bags, insuring factory-fresh material at time of use. That's why you can count on SOL-SPEEDI-DRI to do *more* work, to give you *more* for your money.

WHEN YOU BUY, BE *SURE* IT'S SOL-SPEEDI-DRI!

Safety and Maintenance Co., Inc., No. 1 Wall St., New York 5, N.Y.

Warehouse Stocks Available in Principal Cities of the United States and Canada

repairs are necessary, and a replacement coil inserted, with no delay in operation of the magnet. Damaged coil can then be sent to the factory for re-insulating. Pole shoes also may be removed after they have become worn. Cutler-Hammer, Inc., 253 North 12th St., Milwaukee 1.

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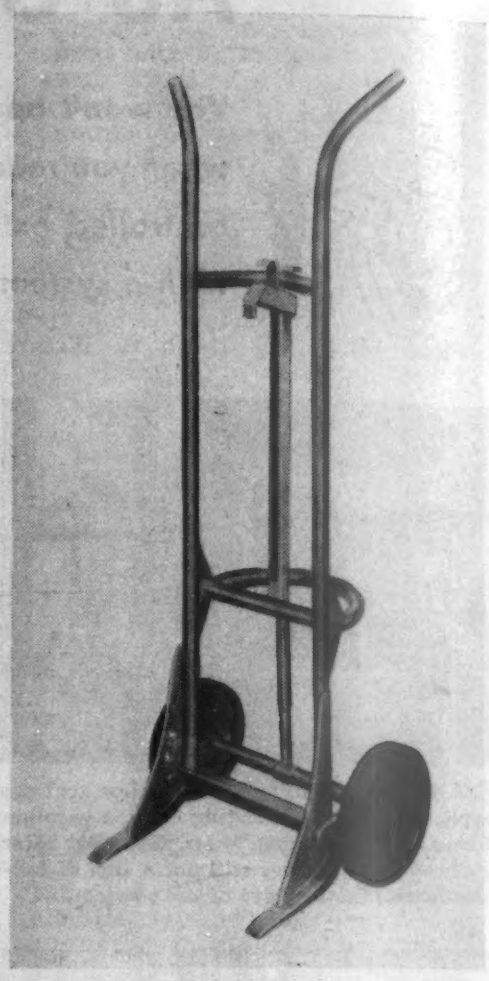

DRUM TRUCK

Hand truck for drums and barrels has a "floating axle" design which holds the truck in a safe, upright position, ready for use at all times. It rides on pressed-steel rubber-tread wheels, and may be pushed directly up to the drum when loading. Manufacturer states that the hinged wheels make it possible for the loaded truck to stand in semi-upright position, supported at four points for greater safety. The American Pulley Co., 4200 Wissahickon Ave., Philadelphia.

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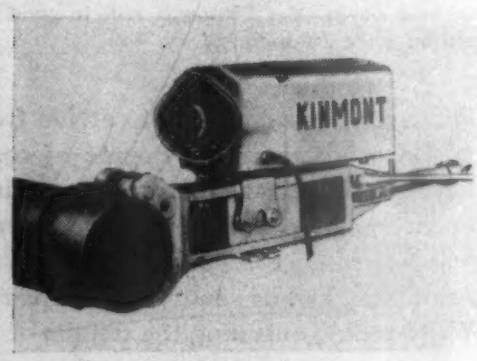

POWER TOOL

Portable power tool is designed for the turning of any round, nearly round, or hexagonal object requiring up to 400 pounds circumferential turning force at a surface speed of from 3 to 26 inches per minute. Suitable for use as a positioner for welding, cutting, fitting, grinding,

Delta 17" Drill Press (for metal, wood, or plastics)
Delta Abrasive Disk Finishing Machine
Delta Super-Hi* Drill Press
Delta 14" Metal-Cutting Band Saw (metal-cutting and wood-cutting)
Delta Abrasive Belt Finishing Machine
Delta Cut-Off Machine
Delta Toolmaker* Surface Grinder

3 ways Delta* Machine Tools help you cut operating costs — without penalizing output and quality

DELTA
MILWAUKEE ®

Mail coupon for free bulletins on Delta metal-working machines:

Bulletin A-14-3 pictures and describes Delta Super-Hi* Drill Presses, for small-hole work from .025" dia. to ¼".

Bulletin A-17 pictures and describes Delta 17-inch Drill Presses.

Bulletin A-20 pictures and describes Delta Cut-Off Machines.

Bulletin A-23 pictures and describes Delta Toolmaker* Surface Grinder, Chip-Breaker Grinder, Tool and Cutter Grinder.

Bulletin A-28 pictures and describes the Delta 14-inch Metal-Cutting Band Saw.

Bulletin A-31 pictures and describes Delta Abrasive Finishing Machines (belt and disk types).

*Trade Mark Reg. U.S. Pat. Off.

BY fully utilizing the portability and compactness of versatile Delta Machine Tools, you cut down your capital investment — and reduce your fixed overhead.

With low-cost, stock-model Delta components, you can:

1. Build high-production, special-purpose machines that can be readily converted to other uses, when changing conditions warrant; thus you save the heavy expense of buying costly special tools of limited usefulness;
2. Modernize obsolete machines, by replacing worn units;
3. Quickly revise or supplement production-line layouts for more efficient operation.

There is no compromise with quality, to bring you Delta's savings in cost, weight, and space; they result from advanced design and from quantity production of standard models.

Perhaps a study of Delta Machine Tools may suggest ways to help keep your costs down, even in the face of high wages and expensive raw materials. Discuss this with your Delta distributor. He is listed under "Tools" in the classified section of your telephone directory. Look for his name.

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M-29

Simplify valve selection with this LUNKENHEIMER "RENEWO" THREESOME...

The "RENEWO" Threesome is fully described in Circular No. 577, which also explains the economy feature of converting one type to another by simply changing seat and disc. A copy is yours for the asking . . . from your Lunkenheimer Distributor or from us direct.

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THE LUNKENHEIMER CO.

"QUALITY"

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1 REGULAR TYPE...

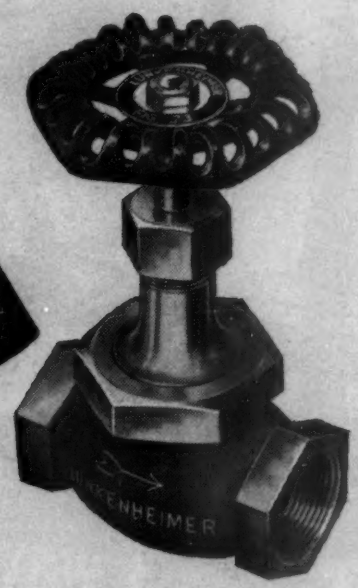


Fig. 73 200 lb. S.P.

Fig. 16 300 lb. S.P.

Regular "RENEWO": one of the most popular and widely used valves ever designed for general service. As the name clearly implies, all parts are renewable.

2 "P" TYPE...

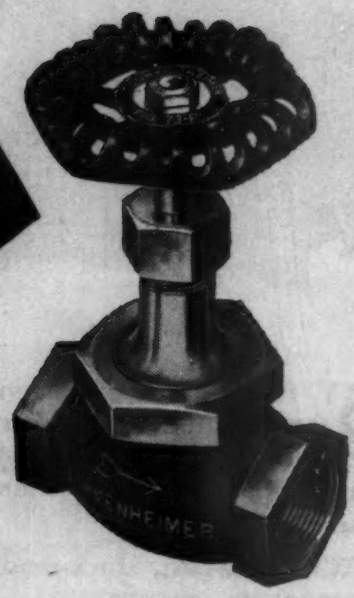


Fig. 73-P 200 lb. S.P.

Fig. 16-P 300 lb. S.P.

"P" (Plug Type) "RENEWO": for throttling, drain, drip, water column blowdown and similar service. The "NS5" Nickel Alloy 330 Brinell seating material, developed and patented by Lunkenheimer, has exceptional wearing qualities and high corrosion resistance.

3 "PS" TYPE...

Fig. 73-PS 200 lb. S.P.

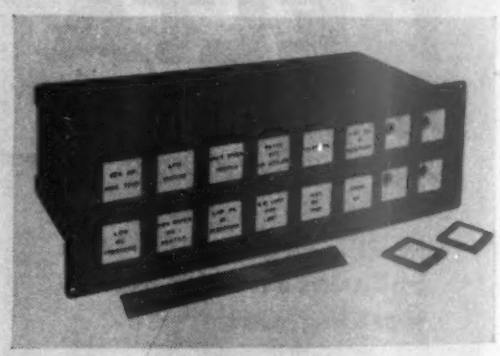
Fig. 16-PS 300 lb. S.P.

"PS" (Plug Type) "RENEWO": for maximum resistance to the effects of close throttling and other severe service, particularly where abrasive conditions are encountered. Equipped with stainless steel 500 Brinell seat and disc.

threading, painting, sandblasting, and similar operations. With adapters of various types, supplied upon request, many other applications are possible, states manufacturer. Unit operates on the chain-tong principle, and weighs 71 pounds. Foot switch accessory permits remote control. Overall dimensions are 40½x10⅛x15⅜ inches. Operates on either a.c. or d.c.; can be plugged into any portable gas-driven arc welder in the field. Reversing switch permits rotation of material in either direction. Kinmont Mfg. Co., Inc., 718 West Wilson Ave., Glendale 3, Calif.

LIGHT CORD REEL

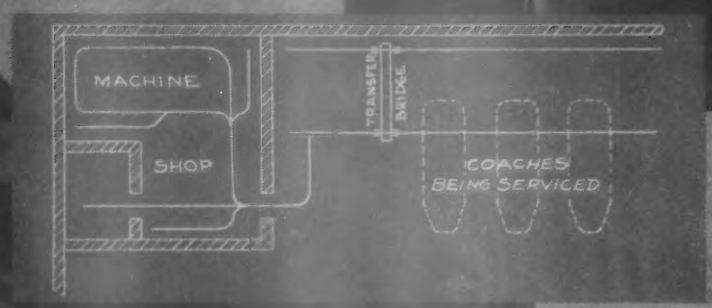
Portable extension cord reel, equipped with socket and guard, is suitable for use in out-of-the-way locations. Equipped with three casters, it can be moved about to focus the light where required. A level-winder arrangement distributes 20 feet of cord, and stacks it when retracted. Benjamin Reel Products, Inc., 10700-10710 Broadway, Cleveland 5.



ANNUNCIATOR

Intended for heavy-duty operation, annunciator, designated Type Ang, may be incorporated in new or existing control panels, actuator boards, racks, or power operators' desks. It may be mounted horizontally or vertically, and may be made up of as many 1x1-in. engraved Lamicoid designations or "windows" as required. Designed to operate on standard voltages, both alternating or direct current, unit is factory tested at 1000 volts a.c. plus two times the rated voltage for 1 minute to insure reliability in operation. In operation, the closing of a normally open supervisory or "trouble" contact closes the control relay of the appropriate

Tramrail System Aids Greyhound Coach Repairs



As indicated in diagram, the Tramrail transfer bridge in photo above may be interlocked with a rail extending from machine shop, making it easy to deliver loads like this engine to shop without rehandling.

Photo at left shows how Tramrail track with switches and curves provides necessary hoisting and conveying service in machine shop.

More than 100 modern Greyhound Coaches are kept in tip-top condition by the Syracuse, N. Y., shop of Central Greyhound Lines, Inc. of New York. To facilitate the handling of engines and other heavy parts in and out of the coaches and in the up-to-date machine shop, a simple Cleveland Tramrail hand-propelled system is provided. This includes standard overhead rail with switches and curves to adequately cover all points where lifts must be made.

The track from the machine shop passes through a doorway and extends to the runway of an overhead traveling Tramrail bridge which may be interlocked with it. The arrangement is such that an engine can be removed from a coach and transported via the overhead system directly to the machine shop without rehandling.

This is one of 30,000 Cleveland Tramrail installations. Regardless of what your materials handling problem is, most likely we have already solved dozens of similar ones.

GET THIS BOOK!

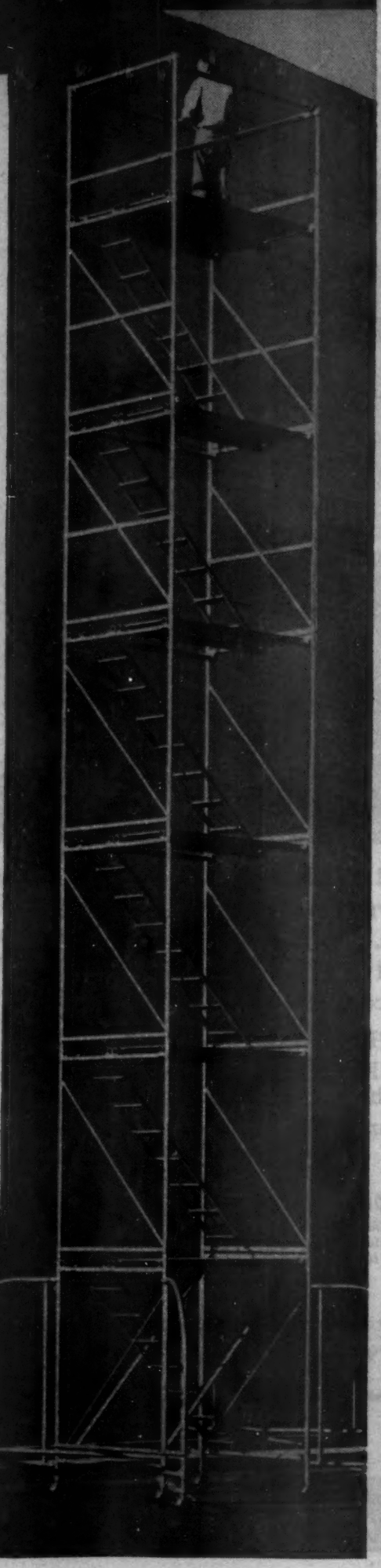
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3230 EAST 284th ST. *WICKLIFFE, OHIO*

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

"GROWS LIKE JACK AND THE BEANSTALK"

SET UP A 45 FOOT SCAFFOLD IN ONLY 15 MINUTES!



Revolutionary, New

ALUMINUM ALLOY

"UP-RIGHT" SCAFFOLDS

Yours . . . this sensational cost-cutting scaffold advancement. A 7 foot, single section unit requires only 1 minute to erect . . . a 45 foot multiple unit only 15 minutes. Rolled easily from position to position throughout the job. Stronger than structural steel yet one-third the weight. Safety tread stairway completely within the structure. No wrenches, no wing nuts, no bolts, no loose parts. Each section folds flat.

Write For Descriptive Circular

"UP-RIGHT" SCAFFOLDS

ROOM 104

1013 PARDEE ST.

BERKELEY, CALIF.

Offices in All Principal Cities

designation. This illuminates the lamp behind the designation, and sounds a remote audible alarm which continues until the signal is acknowledged by pressing a silencing switch mounted separately from the annunciator. The Autocall Co., Shelby, Ohio.

•

FLOOR MACHINE

Floor maintenance machine, P-17, scrubs, waxes, polishes, steel wools, sands, and shampoos. It has a 17-in.-dia. brush, ¾-hp. heavy-duty motor, and interchangeable attachments for various floor maintenance jobs. Clarke Sanding Machine Co., Muskegon, Mich.

•

NYLON-COVERED WIRE ROPE

Available in diameters ranging from 1/32 to 1 inch or greater, nylon-covered wire rope is said to be unaffected by oils, cleansing agents, marine growths, and all alkalis. It is not harmed by nitric, hydrochloric, or sulphuric acid in concentrations up to approximately 1 per cent. Tests indicate that it is not affected by high or low temperatures, and retains its flexibility whether wet or dry. Rochester Ropes, Inc., Culpeper, Va.

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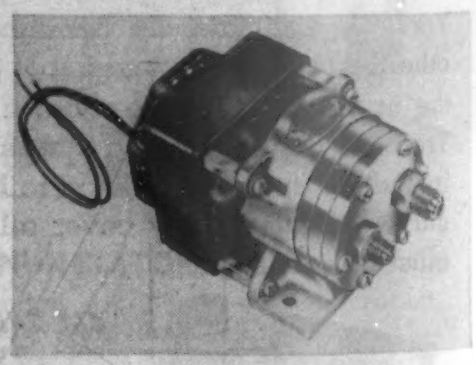


PUMP

Motor-driven metering pump unit has a check valve arrangement which is said to provide immediate discharge of fluid and to prevent dripping or leakage when pump motor is not operating. Manufacturer states that because it is made of stainless steel and pure carbon, it will not contaminate or otherwise affect fluids being pumped. Powered with a 1/35-hp. shaded-pole induction motor, 4 poles, suitable for intermittent duty without fan. Weighs 7

the grinding job

Grinding with efficiency and economy on the production lines of American Industry . . . from precision finishing a wide variety of component parts for the automotive industry to rough snagging castings and billets in foundries and steel mills. *Every industrial plant uses grinding wheels!*

the wheel

Simonds Abrasive Co. Borolon and Electrolon Grinding Wheels vitrified, silicate, resinoid or shellac bonded . . . in every required size, shape and grain and grade specification . . . fast cutting, long lasting—for extra efficiency, top economy on every grinding job.

Borolon — ALUMINUM OXIDE

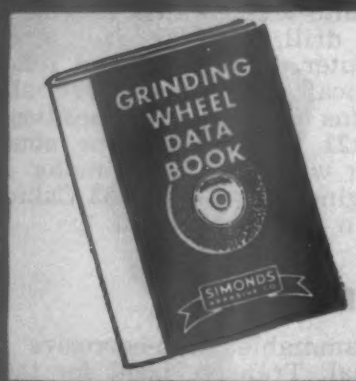
Electrolon — SILICON CARBIDE

SIMONDS ABRASIVE CO.

PHILADELPHIA, PA.

Grinding Wheels

Every size and shape for every grinding job . . . centerless, crankshaft, cut-off, cylindrical, internal, knife grinding, mounted points, portables, roll grinding, saw gumming, snagging, surfacing (wheels and segments), tool and cutter, bricks, sticks, stones and abrasive grain for polishing, pressure blasting, anti-slip, etc.



where to get it

From your Simonds Abrasive Co. Distributor located in all key industrial centers here and in many foreign countries. He carries local stocks and can advise on grinding wheel selection. Write today for our Grinding Wheel Data Book, 112 pages of practical information about grinding wheels and their uses. Also contains name and address of distributor serving your area.

SIMONDS ABRASIVE CO.
Philadelphia, Pa.
Electric Furnace Plant, Simonds Canada Abrasive Co., Ltd., Arvida, P.Q.

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO
Fitchburg, Mass.
Saws, Machine Knives, Files

Other Divisions

SIMONDS STEEL MILLS
Lockport, N.Y.
Special Steels

SIMONDS CANADA SAW CO. LTD.
Montreal, Can.
Simonds Products for Canada

You can count on the utmost efficiency when you use Simonds Abrasive Company grinding wheels—products quality controlled from the crude abrasive produced by our own electric furnace plant, Simonds Canada Abrasive Co., Ltd., to the finished wheels, tested and ready for top performance—efficient production tools backed by their manufacturer's experience as a major manufacturer of grinding wheels and abrasives exclusively for over 50 years. For consistently high quality results, use Simonds Abrasive Company wheels.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PENNA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

for HEAVY-DUTY and EASY HANDLING

it's MM MINNEAPOLIS-MOLINE MODERN MACHINERY

INDUSTRIAL TRACTORS

The 27 H. P. RTI and the 49 H. P. UTI MM Industrial Tractor are modern material movers . . . masters of difficult material handling situations. Winches, cranes, loaders, pull-behind scrapers *quickly and economically* adapt the rugged MM wheel type Tractors to a wide variety of applications. 'V' type and reversible snow plows, rotary brooms, dozer blades, and MM side-mounted and pull-behind mowers adapt the MM for low-cost, efficient maintenance work. Cabs are also available for the protection of the operator.

Transport raw materials or finished products with cost-cutting, dependable MM Industrial Tractors that give year-around economical performance under the most severe conditions! Large diameter pneumatic wheels "cushion ride" heavy loads swiftly over all types of surfaces. Choice of two sizes to suit any job. Large load capacity front end and Ross steering assembly assure *EASY HANDLING* under all load and road conditions.

A complete line of MM Industrial Power Units from 25 H. P. to 230 H. P. offers economical power for all types of engine-driven equipment.

See your MM Dealer-Distributor or write

MINNEAPOLIS-MOLINE

POWER IMPLEMENT COMPANY

MINNEAPOLIS 1, MINNESOTA

pounds, and may be installed on new or old equipment. Directly connected to reservoirs, it permits open tank storage of liquids to be pumped together with direct discharge into receiving receptacles. Mechanical Products Corp., 186 North Ogden Ave., Chicago.

•

VENTILATING FAN

All-purpose, 30-in. cooler fan may be mounted on walls or installed in either the upper or lower portion of double windows. It exhausts 5600 c.f.m., has a resilient rubber hub-mounted motor, four blades, and steel shaft that operates on two sleeve-bearing pillow blocks. Accessories include four rubber feet for insulating the fan housing from floor or window sills, and fittings for installation in any window with a minimum opening 30 inches square. The Emerson Electric Mfg. Co., St. Louis 21, Mo.

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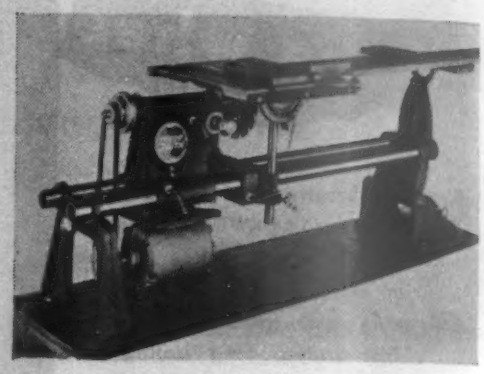


POWER TOOL

Combination power tool, called Shopsmith, designed for use by plant maintenance departments, can be made into a lathe, disk sander, horizontal drill, circular saw, grinder, and router. Tilted on hinge, it makes a vertical drill press. Over-all dimensions in horizontal position are 59x18x21 inches. May be obtained with or without a ½-hp. motor. Magna Engineering Corp., 465 California St., San Francisco, Calif.

•

SOLVENT

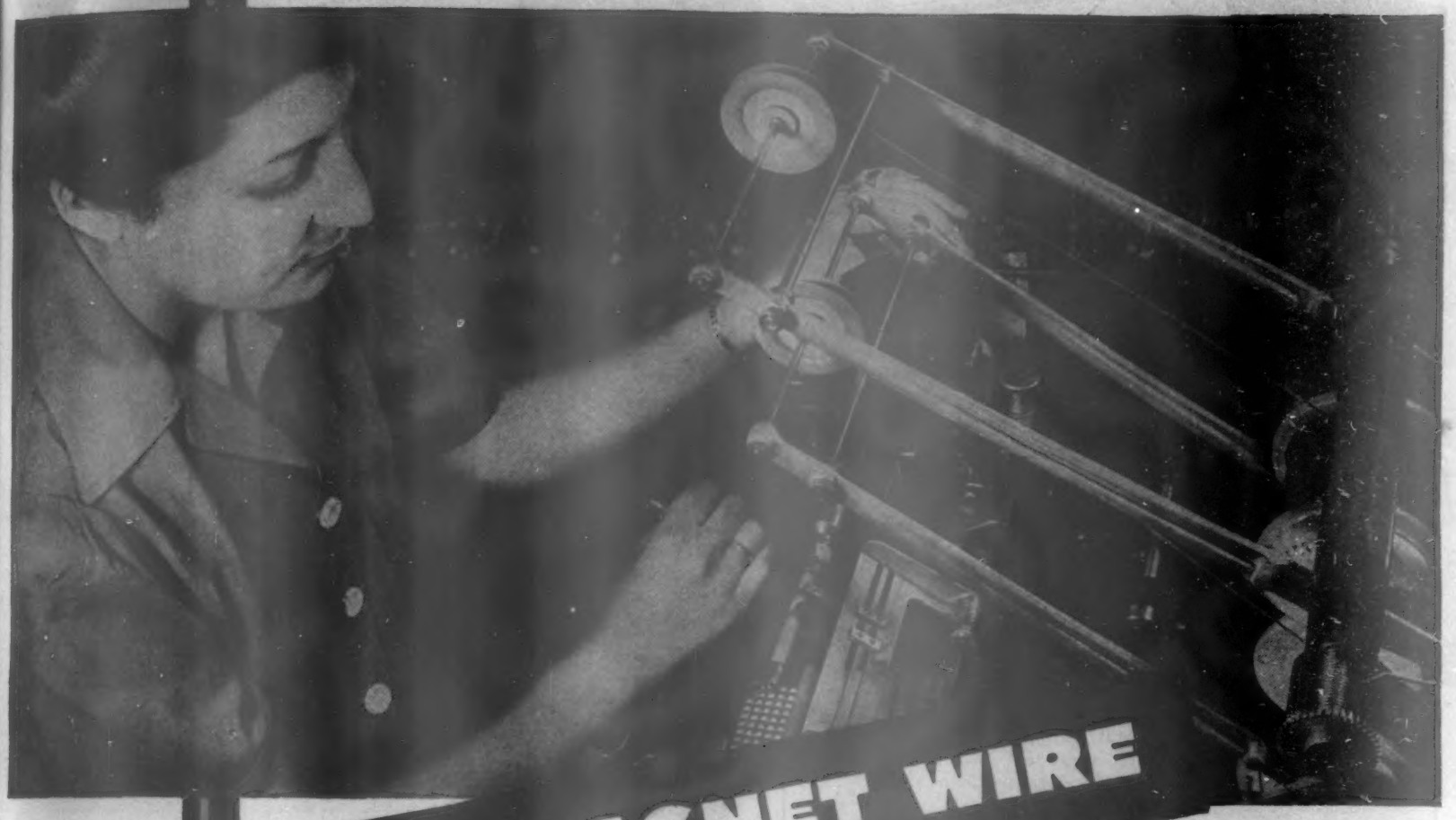
Non-flammable, non-corrosive tank material, Transpo, used for the removal of carbon, sludge, grease, and paint, is a two-layer material comprised of a floating chemical seal and a lower layer of potent cleaning agents. Designed to act effectively at room temperature, manufacturer states that there is no need for agitation or heating to maintain its efficiency year round. Turco Products, Inc., 6135 South Central Ave., Los Angeles, Calif.

•

SPRING KITS

Two spring kits, each including a supply of stock springs, are designed for those who frequently need small extension springs with looped or hooked ends. The Senior kit includes a looping tool, called Model A Hook-Kon, which is adjustable to put open hooks, single loops, or double loops either across center or to one side of extension springs up to ½-in.-dia. and 0.0625-in.-dia. wire; a No. 1

for HIGH-SPEED WINDING!..



MAGNET WIRE INSULATION comes up against it in automatic, high-speed winding operations! And that's why ROEVAR Magnet Wire is the choice to make... ROEVAR'S insulation is remarkably tough—shows three times the abrasion resistance of standard enameled wires.

Over and above its extreme toughness, tests show that the insulation of ROEVAR Magnet Wire maintains its dielectric strength dependably despite the destructive forces of actual service. It stretches much farther than enameled wire, without cracking or losing its bond to the conductor. It is exceptionally resistant to the solvents used in coil-treating varnishes and to varnish-baking temperatures. Further, ROEVAR Magnet Wire costs less and has better space factor than magnet wire with paper, cotton or silk insulation. It is available in sizes No. 14 to 40 A.W.G.

Roebling engineers are anxious to work with you in helping determine where ROEVAR Magnet Wire can be used most effectively and with most profitable results. Write for full information and samples of wire.

Even though closely knotted, ROEVAR wire insulation does not crack or loosen from the conductor.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
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ROEBLING

A CENTURY OF CONFIDENCE

JAR ROEBLING

★ WIRE ROPE AND STRAND ★ FITTINGS ★ SLINGS ★ SUSPENSION BRIDGES AND CABLES ★ AIRCORD, AIRCORD TERMINALS AND AIR CONTROLS ★ AERIAL WIRE ROPE SYSTEMS ★ ELECTRICAL WIRE AND CABLE ★ SKI LIFTS ★ HARD, ANNEALED OR TEMPERED HIGH AND LOW CARBON FINE AND SPECIALTY WIRE, FLAT WIRE, COLD ROLLED STRIP AND COLD ROLLED SPRING STEEL ★ SCREEN, HARDWARE AND INDUSTRIAL WIRE CLOTH ★ LAWN MOWERS

No. 1 of a series of questions and answers designed to highlight the extensive and amazing uses of graphite—from pencils to atomic bombs.

SOURCE AND PROPERTIES OF GRAPHITE

QUES. What is graphite?

ANS. One of the softest minerals of the carbon family—believed to be an end product of natural processes involving heat, pressure and time—extremely lubricous or slippery, non-metallic, non-magnetic, non-toxic and non-odorous.

QUES. Where are the principal commercial sources of graphite?

ANS. Madagascar, Ceylon, Mexico and Korea. Some are found in the United States.

QUES. Is there more than one type of graphite?

ANS. Yes. The natural crystalline type is found in laminations of very thin flakes and in vein-like strata of fibrous structure. The natural amorphous type is of rather earthy structure.

QUES. Which type of graphite is obtainable in the highest purities?

ANS. The crystalline varieties, after refinement, run highest in graphitic carbon.

QUES. In what average particle sizes are processed graphites available?

ANS. Over an extremely wide graduated range from an average of 2 microns to large flake sizes containing particles from ⅓ to 2 millimeters.

More on *"Source and Properties of Graphite"* in next ad.

A few of thousands of widely used products containing Dixon's Graphites. Those starred are Dixon products, many of them sold by supply houses everywhere.

★Microfyne Flake Graphite

Cub . . . 15¢

Type 4 . 40¢
★Graph-Air Guns

★Cup Grease No. 3

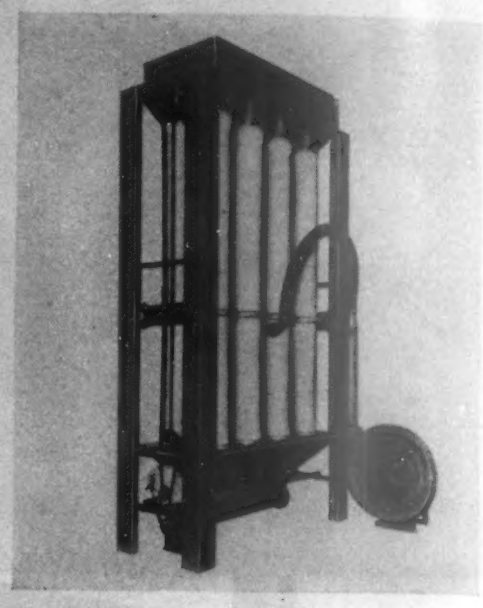
Now may we receive *your questions* on how graphite can help *you?*

DIXON'S GRAPHITES

Products of
JOSEPH DIXON CRUCIBLE COMPANY
Jersey City 3, N. J. — Div. 44-Q-8

LOOK FOR No. 2
In this series. We will gladly send you reprints of any you may miss

spring cutter, with calibrated scale for cutting springs to accurate lengths; 112 feet of stock springs ranging from 0.012 to 0.0625-in.-dia. wire and in spring diameters from 3/32 to ½ inch, in lengths up to 12 inches. The Junior kit contains the looping tool, 20 feet of extension springs, and 4 feet of compression springs. Both sets are packed in a metal box suitable for a permanent storage container, and each size is packaged in an individual envelope on which the code number and complete specifications are marked. Gardner Wire Co., 5045 West Lake St., Chicago 44.



DUST FILTER

Self-cleaning dust filter, called Autoclean, is said to provide positive and continuous cleaning by means of slow-traveling "blow-back" rings through which high pressure air is blown in a reverse direction through cloth tubes. Dust adhering to the inside surface is dislodged and falls down into a hopper where it is carried away continuously. Vertical movement of the ring frame is accomplished by means of a chain and sprocket drive. Units are furnished in multiples of four tubes. The Day Co., 810 Third Ave., N.E., Minneapolis, Minn.

HOSE COUPLING

Available in ½, ¾, and 1 inch inside diameter, high-pressure hose coupling is said to withstand pressures of more than 3000 p.s.i. with a pull of over 500 pounds. It is suitable for use in firefighting and fire equipment, in spraying, and other industrial fields. It is 4½ inches long. Made for rubber-covered hose, the standard coupling is bronze, but it may be obtained with Chrome-plated finish upon request. Bar-Way Mfg. Co., Stamford, Conn.

PAINT, AIR HEATER

A hot-spray painting process, called Thermal Control, heats paint to any desired temperature in order to create good spray painting conditions. Two models are available, one that heats only the paint, another that heats both the paint and the atomizing air. Surface of the work

The gains made by this company* in soldering kitchen utensil assemblies are profitable from any angle.

They saved $6,384 every 28 working days. They slashed power costs heavily. They cut rejects. They reduced polishing time sharply. And they stepped up production from one utensil per man-hour to 600 per man-hour!

The skillful application of work-handling equipment and Westinghouse radio frequency heating did all this. The teaming of motion and electricity by Westinghouse engineers in this example paid off the original investment in 60 days!

Make kitchen utensils or build radio cabinets, it's all the same. Combine motion and electricity properly and you have a new production giant.

Want proof? Fourteen case histories in booklet B-3620A give you facts, cite figures, demonstrate how Westinghouse engineers blend motion and electricity to give you this production wizard. Write for it. It's an important contribution to production management. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-02126

Name on request

Check this use-list against your own production

Induction heating for
Metalworking
annealing—brazing—soldering—surface, contour and through hardening.

Dielectric heating for
Wood
edge gluing—assembly gluing—laminating.

Rubber
drying and curing—preheating preforms.

Plastic
preheating preforms—bonding laminates.

Textile
drying—twist-setting.

Food
de-infestation.

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE
R.F. HEATING

MORE PRODUCTIVE POWER FOR INDUSTRY

NORTH • EAST • SOUTH • WEST • IT'S SCHRAMM!

CHOOSE *as others have* THE MODEL THAT BEST FITS YOUR NEEDS!

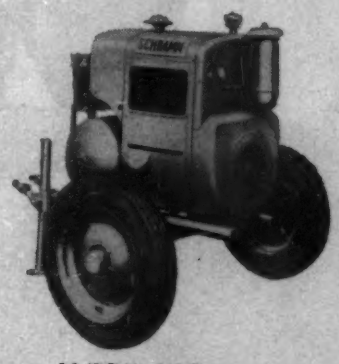
There's a Schramm Air Compressor, size and model, to meet your specific needs!

Below are listed some of the many Schramm models, portables ranging from 20 to 420 cu. ft. of actual air, the stationary ranging from 2 to 600 cu. ft. displacement.

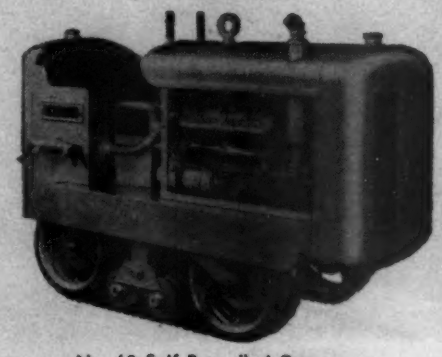
On all models performance records are evidence of their high quality. You will find the name Schramm written on every important page in compressor history.

Features you get in Schramm are: 100% water cooled, assuring ideal performance summer and winter; mechanical intake valve, forced feed lubrication, and electric-starter starting. All Schramms are compact, lightweight, easy to operate.

We invite you to write today for fully illustrated catalog describing in detail each of the Schramm Air Compressors shown here . . . plus a wide range of other models. We feel the Schramm story is a good one, and offers you a sure way to get your many compressed air jobs done quickly, efficiently, and economically.

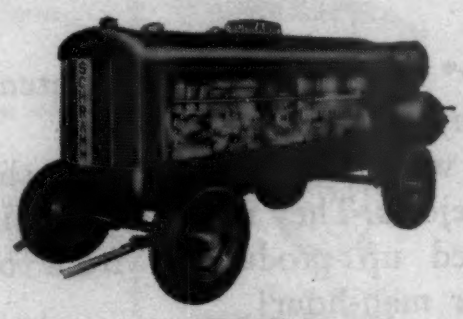


20/35 Model Compressor

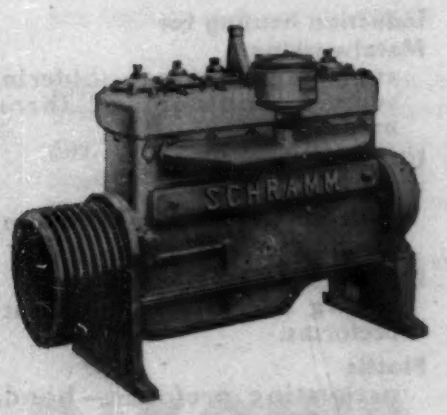


No. 60 Self-Propelled Compressor

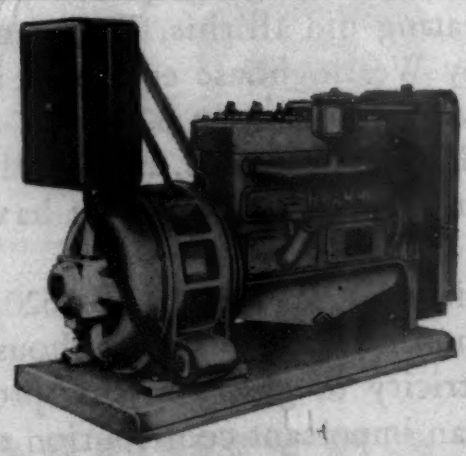
Skidded for Truck Mounting



Diesel Engine Drive



"V" Belt on Flat Pulley Drive



Built-in Motor Drive with Cooling Unit and Starter

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

also can be heated to obtain the correct temperature combination. The use of this process is said to reduce paint viscosity and lower the amount of thinner required, which cuts down air pressure, and keeps overspray to a minimum. Bede Products, Inc., 3309 West 118th St., Cleveland 11.

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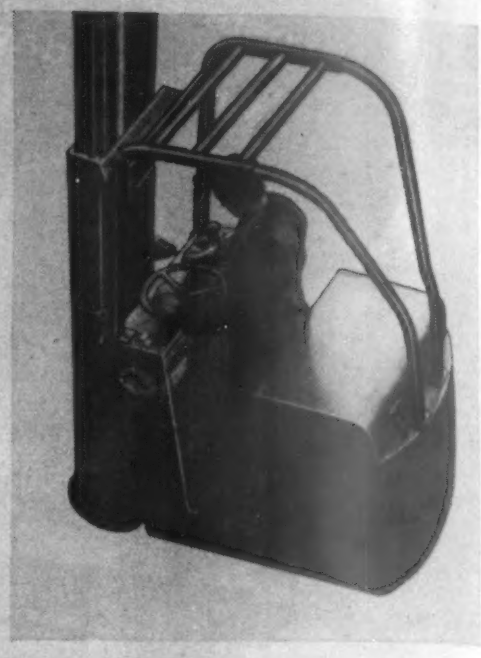

POWER TRUCK OVERHEAD GUARD

Heavy-duty canopy-type guard, constructed of tubular arc-welded steel and supported at four points on the truck, was designed to protect operators of power trucks from falling objects. An expanded metal screen to fit over the horizontal portion of the guard is available where required. Guard is detachable, and can be adapted to fit every model of manufacturer's gasoline or electric powered "Standrive" fork trucks. Lewis-Shepard Products, 276 Walnut St., Watertown 72, Mass.

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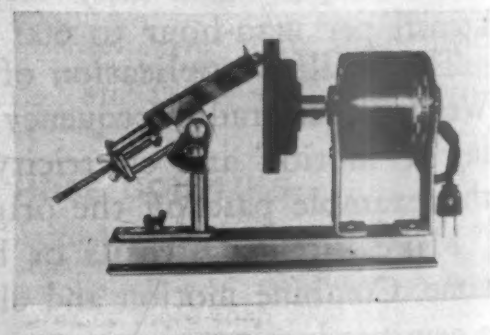


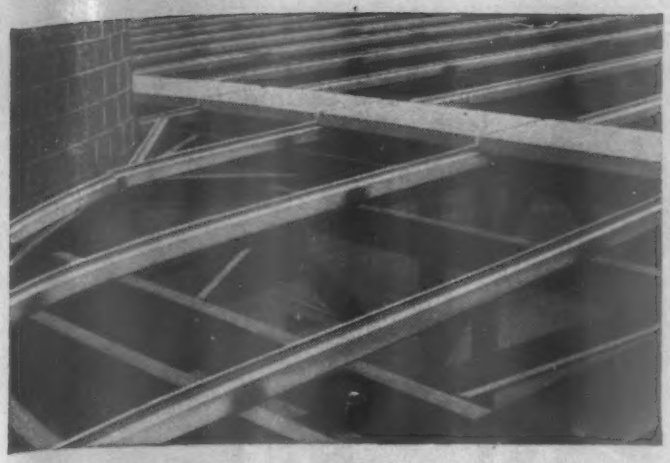
DRILL GRINDER

Adjustable for drill lengths from 1½ inches up to 2 or 3 feet, drill grinder is said to sharpen the average drill in 30 seconds. It comes complete with protractor fixture and spacer. Backstop can be removed and drill of any length accommodated; grinder takes from 3/32 to 1¼-in. widths. Motor is mounted on lightweight metal base. E Z Mfg. Co., 4408 San Fernando Rd., Glendale 4, Calif.

•

MECHANICAL SEAL

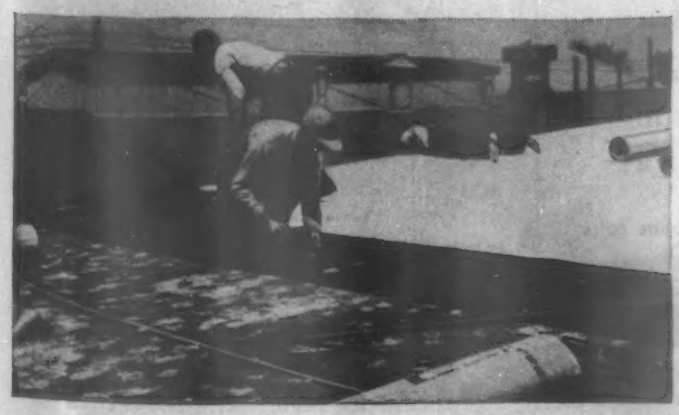
Type P.S. mechanical seal, used for hydrocarbons in the 600 p.s.i. range at temperatures up to 250 deg. F., rotates with the shaft, with no wear on shaft or sleeve. Can be installed in conventional stuffing boxes on new



KAYLO INSULATING ROOF TILE is strong—runway shown above supports wheelbarrow traffic during construction.

KAYLO INSULATING TILE is lightweight. Each tile is 2⅝ x 18 x 36 inches in size, weighs approximately 21 pounds.

KAYLO INSULATING ROOF TILE can be cut and fitted with ordinary hand or power tools right on the job.



WHEN LAID, Kaylo Insulating Roof Tile is covered with conventional built-up tar or asphalt roofing. No other insulation is necessary.

KAYLO INSULATING ROOF TILE is laid on sub-purlins. After grouting joints, deck is ready for built-up roofing.

KAYLO®
Insulating Roof Tile

AMERICAN STRUCTURAL PRODUCTS COMPANY
Subsidary of
OWENS-ILLINOIS GLASS COMPANY

New idea for industrial roofs!

Kaylo Insulating Roof Tile offers advantages never before available in a structural product!

KAYLO Insulating Roof Tile combines in a single material structural strength, extreme lightness and high insulating ability. Composed entirely of inorganic materials, Kaylo Roof Tile is fireproof.

Owners, Architects and Builders all profit with Kaylo Insulating Roof Tile. It furnishes fire protection, cuts fuel costs and is easy to install.

Because Kaylo Roof Tile forms a lightweight and structural deck, less steel is required for roof framework. Cutting and fitting of tiles, when needed, can be done on jobsite, using ordinary hand or power tools.

For further information, mail the coupon today.

AMERICAN STRUCTURAL PRODUCTS COMPANY
P.O. Box 1035, Dept. E-428
Toledo 1, Ohio

Gentlemen: Please send free 8-page illustrated booklet, "Kaylo Insulating Roof Tile."

☐ Request for sample is enclosed on company letterhead.

Name_____

Address_____

Firm_____

City_____ Zone_____ State_____

NOW—Dravo *Counterflo* Heaters can be shipped promptly from stock.

AND—Immediate availability means that you can take advantage of the summer air-circulating feature right now. You simply flick the selector switch and the large fans instantly go to work to help maintain comfortable working conditions for employees. Even more important, you'll be prepared in advance for next heating season.

NOW—The Dravo *Counterflo* Heater is listed by Underwriters' Laboratories and approved by the American Gas Association.

In thousands of industrial and commercial establishments you'll find Dravo *Counterflo* Heaters establishing records for efficiency and economy. They'll prove their worth to you, too, and they can be

SHIPPED IMMEDIATELY FROM STOCK
for Winter Heating and Summer Ventilating.

For quick action call the Dravo Representative listed under "HEATERS" in your classified telephone directory, or contact Heating Section, Dravo Corporation, Pittsburgh 22, Pa.

Dravo also manufactures the DRAVO CRANE CAB COOLER *for air conditioning hot-metal crane cabs*

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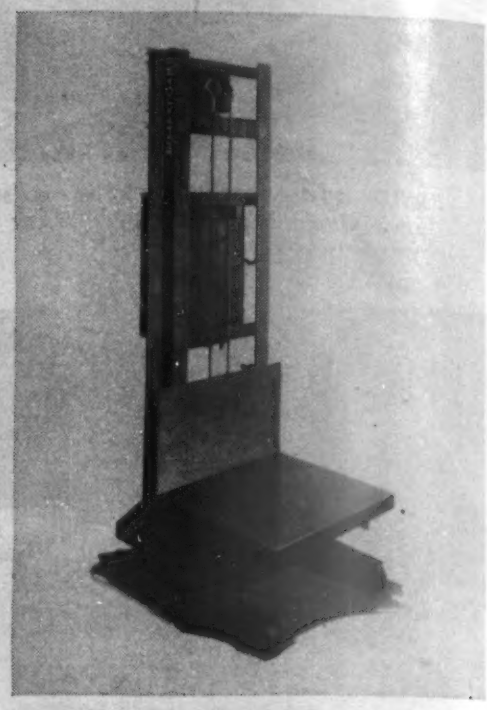
Sales Representatives in Principal Cities
Mfd. and sold in Canada by Marine Industries, Ltd., Sorel, Quebec

or old equipment. Has balanced thrust control for proper alignment and pressures for sealing faces. Provides dry sealing for propane, butane, and other hydrocarbons, according to maker, with no auxiliary lubricating system needed. Durametallic Corp., 2104 Factory St., Kalamazoo 24F, Mich.



PORTABLE ELEVATOR

Lightweight, hand-operated portable elevator, known as the Uplifter, weighs 415 pounds. It rolls on Timken bearings, has a turning radius of 45 inches. The over-all height is 77 inches, and the height of lift, 62 inches. Platform is 24 inches square, and height when lowered, 4½ inches. Manufacturer states that by lengthening the hoisting cable, running it through a double sheave, the capacity of the elevator may be increased from 500 to 1000 pounds with about the same amount of pressure on the crank handle. Revolvator Co., North Bergen, N. J.

GREASE DISPENSER

Designed for use on standard-sized grease pails, dispenser is designed to fill grease guns without removing the grease from the pail in which it is received. After the cover is removed from the pail, the dispenser is placed on the pail, attached to the grease gun, and the grease pumped

SWITCHBOARDS

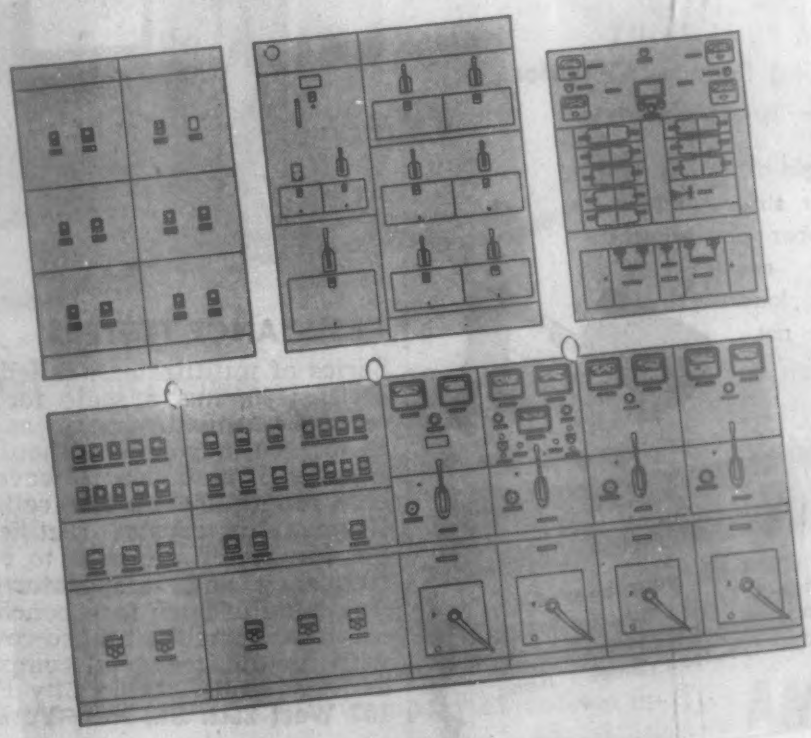
Tailor-Made

TO FIT EACH JOB

QUICK DELIVERY through enlarged production facilities and streamlined manufacturing procedures.

ENGINEERING SERVICE— layouts and quotations by qualified Field Engineers in all principal cities.

EXPERIENCE—design and manufacturing "know how" gained through long experience in electrical distribution and control equipment fields, and *specialization* in switchboards.



Switchboards are the *foundation* of all electrical distribution systems. Sound basic design and dependable equipment are essential to effective protection and consistent, long-time service.

SQUARE D manufactures a complete line of switchboards and the items of electrical distribution and control equipment used in them.

A SQUARE D installation means that you *always* will be able to change or add circuits as new requirements develop.

Call in your nearby
Square D Field Engineer

for further information on switchboards and all types of electrical distribution and control equipment.

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

NEW DRUM TRUCK!

AMERICAN ALL-STEEL DRUM KING

Easy One-Man Loading! The new *American* Drum King Truck makes drum and barrel loading and hauling an easy, safe, one-man operation. Drums can be loaded quickly and maneuvered with ease and complete safety. Use this new *American* Drum King to speed hauling and reduce operating costs. All-Steel construction keeps the truck on the job . . . keeps maintenance costs down.

ONLY DRUM KING HAS ALL THESE FEATURES!

❶ GREATER SAFETY — Drum King Stands Upright!

Unique "floating axle" design permits the truck to stand in a safe, space-saving upright position *when not in use*. This feature eliminates the hazardous condition of drum trucks lying on the floor.

❷ EASY TO LOAD — Roll Drum King Right Up To The Job!

No need to "jockey" or "inch" the truck into position. Wheels roll truck up to drum, fast and easily. Hook drops over chime of drum when released. As the load is broken, the nose prongs automatically slide under load and wheels automatically move into load-carrying position.

❸ SAFE, FOUR-POINT LOAD SUSPENSION — Permits Hook To Be Disengaged After Truck Is Loaded!

Greater safety for both operator and truck is assured because, should the loaded truck strike an obstacle, the load is free to leave the truck without pulling operator and truck along with it.

❹ LOADED TRUCK CAN STAND ALONE — Semi-Upright Position Keeps Load Ready To Move!

Hinged wheels permit the loaded truck to stand in semi-upright position.

❺ TRUCK ROLLS EASILY — Drum King Reduces Operator Fatigue--Speeds Hauling!

Full weight of load is carried over strong pressed-steel rubber-tread wheels. Operator easily balances load — does not carry it.

Mail This Coupon Today!

Please send me your new American Hand Truck Bulletin HTB48 featuring the complete line of American Pressed-Steel Hand Trucks.

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

AMERICAN PRESSED-STEEL HAND TRUCKS

The American Pulley Company

4212 WISSAHICKON AVE. • PHILADELPHIA 29, PA.

directly into the gun. Manufacturer says the grease is kept free from dirt and foreign matter, air pockets are eliminated, completely filled gun is assured, and no grease is wasted. K-P Mfg. Co., 1226 Linden Ave., Minneapolis, Minn.

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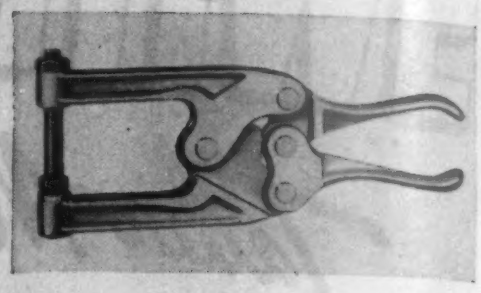

PLIERS

Toggle-action pliers, called Knu-Vise, have large square throat capacity which permits thick work to be inserted between the jaws. Spindle diameter affords good stiffness and secure grip, states manufacturer, particularly in lifting or pulling applications. For use in welding operations, copper spindles which repel weld splatter may be obtained. Two models: P-1200, with throat capacity of 1 9/32x2¼ inches, providing 1200-lb. clamping pressure; and P-1800, with throat capacity of 1 9/32x1¼ inches, providing 1800-lb. clamping pressure. Lapeer Mfg. Co., Lapeer, Mich.

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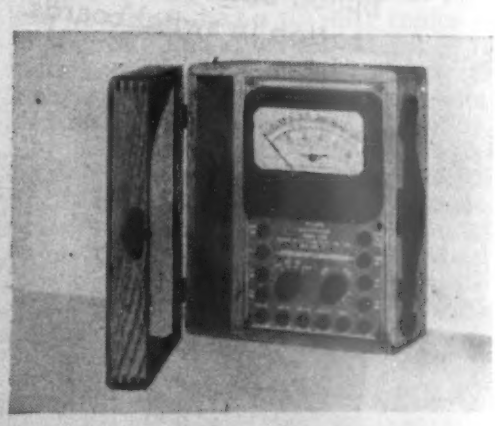

RESISTANCE TESTERS

Series of multitesters, called Hi-Meg Model 450, has a scale for making resistance measurements as high as 50 to 1000 megohms without the use of tubes or batteries. However, lower ohm ranges use a single cell battery. Germanium crystal rectifiers used for the meter are said to eliminate frequency and temperature errors. Available in open face bench models or in a portable hinged-cover case with handle, test lead compartment, and test leads. Radio City Products, 152 West 25th St., New York 1.

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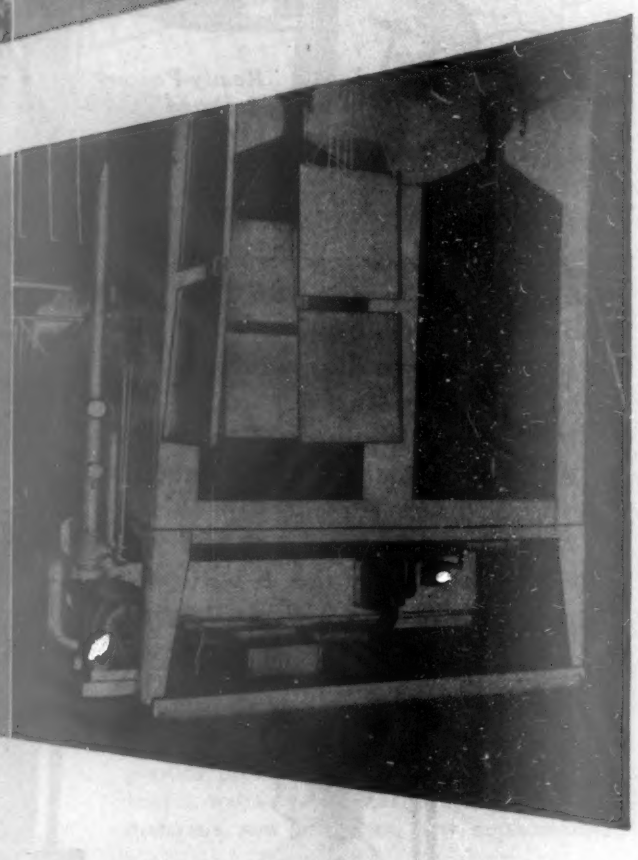
LAMP CHANGERS

Line of lamp changers is designed to remove and replace screw-type lamp bulbs in rigid sockets in high and out-of-the-way places. Rubber-covered flexible spring fingers, when pushed over the lamp bulb, hold it securely. Pole is then rotated counterclockwise to remove the lamp, clockwise to install. Manufacturer states that it can handle lamps on sidewalls or at an angle. A cord attached to the swiveled ring allows

General view showing two ovens served by conveyors; these Gas-fired ovens were installed right in the production-line for continuous drying of painted material.

Versatile GAS Fulfills EVERY PRODUCTION-LINE HEATING REQUIREMENT



Tunnel washer showing conveyor-line method of handling painted ware; Gas-fired immersion burners heat the washing solution.

HEAT PROCESSING of painted metal fixtures is just one of the many functions which GAS performs in modern manufacturing. But it's an important function because modern Gas Equipment can be installed right in the conveyor line for continuous production.

That's the way The Edwards Manufacturing Company uses GAS in its steel furniture manufacturing plant at Cincinnati, Ohio. Company executives investigated many modern productioneering methods and from this study developed a conveyor system to carry the material through washers, dryers, painting chambers, and ovens.

In this system the productive flames of GAS supply heat for washers, dryers, and finishing ovens. Flexible GAS is so readily controlled that it can be adjusted to any required temperature and used for every heating requirement in this production system.

Plant Manager Morgan Buford expresses his satisfaction with GAS—"The GAS Equipment has enabled us to streamline our operations so that our production-lines turn out the work with considerably lower expense for GAS than we anticipated."

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

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THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

PEAK PRODUCTION EVERY HOUR

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Ready-Power-equipped Clark Fork Truck

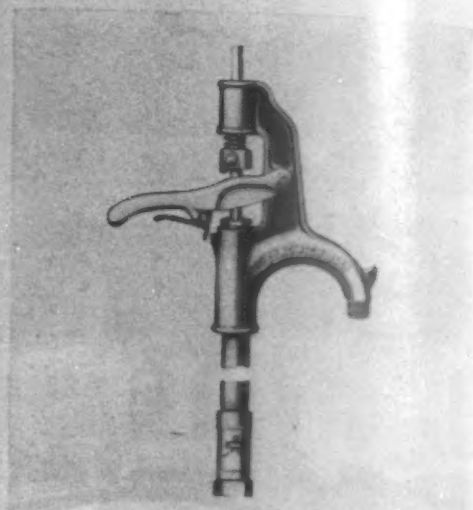
There's no tapering off or let down when your industrial truck is powered by a Ready-Power gas-electric Power Unit. For "constant-peak" power is generated right on the truck chassis—by an engine-driven direct current generator. No matter what make or type of electric truck you use, it will pay you to investigate Ready-Power. Write today for details.

Ready-Power-equipped Elwell-Parker Fork Truck

THE READY-POWER CO.

3820 Grand River Ave., Detroit 8, Michigan

the wrist-like coil spring to be bent, so that the head may be placed at any required angle. Industrial Products Co., 2809 North 4th St., Philadelphia 33.



NON-FREEZING HYDRANT

Designated Model JK, non-freezing ground hydrant has an all-brass packing gland, finger latch which permits locking in open position, and a pipe measuring 26 inches from ground level to hose connection. The James Knights Co., Sandwich, Ill.

CARBON DIOXIDE INDICATOR

Suitable for testing oil burners, furnaces and other heating plants, carbon dioxide indicator is constructed of transparent acrylic material, with metal parts of stainless steel. Pressure tight *O* rings are used as seals. Capable of making three tests a minute, the indicator has a full 4-in. scale that is calibrated to 1/5 of 1 per cent CO_2. Accuracy is said to be ½ of 1 per cent CO_2. Indicator is 8 inches long and 2 inches in diameter. Furnished in a metal carrying case with rubber tubing, aspirator bulb, absorbent solution, and operating instructions. F. W. Dwyer Mfg. Co., 317 South Western Ave., Chicago 12.

CONVEYOR

Hydraulic-powered conveyor, called Turbo-Trimmer, uses a Borg-Warner hydraulic unit, and can be attached to any type of truck or trailer which has its own motive power take-off. It can be elevated to discharge efficiently at a height of 8 feet. Belt speeds are governed by valve setting

ENGINEERED IN PLASTICS BY GENERAL ELECTRIC

Plastics improve your circulation

● Now plastics help to ventilate the kitchen. This rugged propeller is molded in one piece by General Electric for the American Blower Corporation's new Aeropel home ventilator. It is *molded in balance*. And for this Aeropel unit General Electric also molds a sparkling white plastics grille —an attractive housing that adds beauty to any room.

Whatever *you* make, from fans to ferryboats, it is likely that General Electric's complete plastics service can help you to cut production costs or improve your product . . . or both.

Equipped to design, engineer and mold the *right* plastics parts for your requirements, General Electric invites the tough problems and the hard jobs.

If top quality is important in the plastics parts you buy, it will be worth your while to get acquainted with G-E's *complete* plastics service. Phone or drop a line to our nearest sales office. Or write for information and your free copy of the interesting booklet, "Problems and Solutions in Plastics." Plastics Division, Chemical Department, General Electric Company, 1 Plastics Avenue, Pittsfield, Mass.

G-E Complete Service— At No. 1 Plastics Avenue

BACKED BY 53 YEARS OF EXPERIENCE. We've been designing and manufacturing plastics products ever since 1894. G-E research works continually to develop new materials, new processes, new applications.

NO. 1 PLASTICS AVENUE—complete plastics service—engineering, design and mold-making. Our own industrial designers and engineers, working together, create plastics parts that are both scientifically sound and good-looking. Our own toolrooms are manned by skilled craftsmen—average precision mold experience, over 13 years.

ALL TYPES OF PLASTICS. Facilities for compression, injection, transfer and cold molding . . . for high and low pressure laminating . . . for fabricating. G-E Quality Control—a by-word in industry, means as many as 160 inspections and analyses for one plastics part.

GENERAL ELECTRIC

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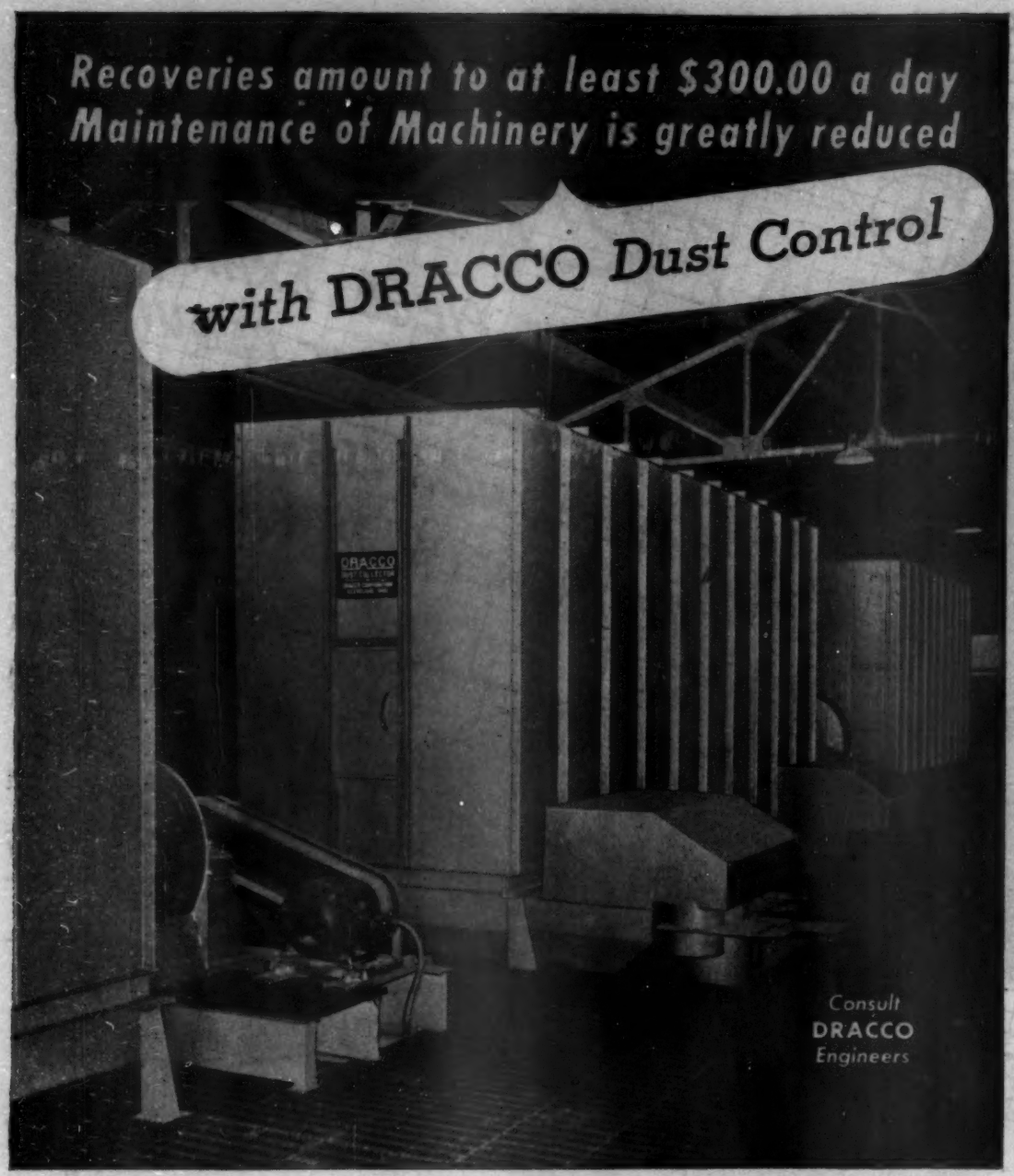
GENERAL ELECTRIC PLASTICS FACTORIES ARE LOCATED IN SCRANTON, PA., MERIDEN, CONN., COSHOCTON, OHIO, DECATUR, ILL., TAUNTON AND PITTSFIELD, MASS.



DRACCO Dust Control saves money in MANY WAYS. In the installation illustrated above at least $300 worth of material was recovered each day. The wages of one man per day for sweeping was saved. DRACCO Dust Control prevented the contamination of raw material. The savings made in maintenance costs the first year paid for half the cost of the entire installation. In addition to the above the elimination of a dust hazard created better working conditions. For over 30 years DRACCO Engineers have solved dust and fume control problems of every description — why not consult them?

DRACCO CORPORATION

4091 E. 116th St., Cleveland 5, Ohio New York Office: 130 W. 42nd St.

DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

on the hydraulic motor. Available in 8-in. and 11-in. belt widths; all steel construction. Bosworth Mfg. Co., 6723 Denison Ave., Cleveland 2.

•

LUBRICATOR VALVE

Designed to deliver a metered amount of oil or grease to each bearing in a lubricating system, hydraulic through-flow valve, known as the Grannan Lubricator, dispenses all lubricants, from light oil to heavy grease. It is installed directly into the bearing, and manufacturer claims that it will function either with hand-operated guns or from a completely automatic system set to operate at any desired interval. Operating temperature is from zero to 300 deg. F. Applications include trucks, machinery, machine tools. Titeflex, Inc., 500 Frelinghuysen Ave., Newark 5, N. J.

•

CALKING COMPOUND

Resin-based plastic calking, called Tub-Tite, seals cracks around washstands, shower stalls, air conditioned rooms, control instruments, explosion-proof motors. Dries within an hour to form white, glossy surface impervious to cleansers, grease, acid, alkali. Manufacturer says it does not become brittle or crack, but remains flexible, expanding and contracting with joint it seals. The American Fluresit Co., Cincinnati 29.

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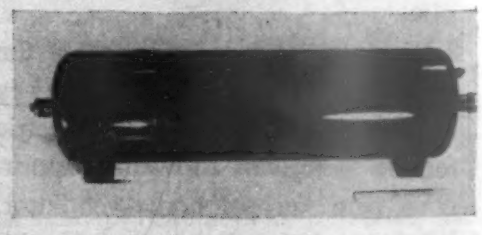


OIL CONDITIONER

Thermosiphon oil conditioner that absorbs moisture, acid, and sludge from transformer oil while transformer is in operation may be mounted on old or new equipment. It is said to maintain the properties of transformer oil or Inerteen essentially the same as transformer liquid dielectrics for as long as the absorbent material remains effective. When, after several years, tests show oil deterioration, replacing the conditioner is all that is necessary, according to the manufacturer. Conditioning agent is in ¼- to ½-in. granules, held within an all-welded steel tank about 4 feet long and 12 inches in diameter, weighing 167 pounds without oil. Westinghouse Electric Corp., Box 868, Pittsburgh 30.

the Cone Reporter makes note that—

Conomatic Progress Reporter

Buffalo Niagara Electric Corp. will soon have the most powerful transformer ever built in this country. It steps up from 13,200 volts to 115,000 volts and can handle 150,000 horsepower.

Progress with Conomatics

A ten-pound plastic molding recently made by General Electric Plastic Div. is said to be the largest ever produced.

Conomatics for *Progress*

Linde Air Products Co. is now supplying liquid nitrogen capable of reducing temperature to –320°F.

Progress with Conomatics

Patent 2,441,594 has been granted for a method of separating iron from low grade ore. The iron patches are magnetized and then separated from the crushed ore by being pulled over a magnet.

Conomatics for *Progress*

A fully equipped Diesel research laboratory has been opened at Oklahoma Agricultural and Mechanical College.

A new Conomatic bar machine now provides simple dial control for change of working stroke travel of all slides. The machine retains all the advantages of Cone's exclusive, powerful, cam drive.

Progress with Conomatics

The new GE electric meter uses magnetic suspension for the rotor shaft instead of bearings.

Conomatics for *Progress*

The factory manager at Bata Works, Czechoslovakia, has an office that moves up and down in the building like an elevator.

Progress with Conomatics

Foote Mineral Co. of Philadelphia has begun the commercial production of zirconium.

Conomatics for *Progress*

Eaton Mfg. Co. has developed an automatic electric shift for its two-speed truck axles.

Kaiser-Frazer Corp. is preparing to make automobile doors of die-cast aluminum.

Progress with Conomatics

Battelle Memorial Institute has succeeded in welding aluminum slabs up to two inches thick.

Conomatics for *Progress*

Since hydraulic equipment is sometimes needed where electricity is not available, Hydro-Power, Inc., of Springfield, Ohio, is making a power unit driven by a gasoline engine.

Progress with Conomatics

Reeves Instrument Corp. is making an electronic computor capable of solving differential equations that is small enough to go in the average engineer's office.

Conomatics for *Progress*

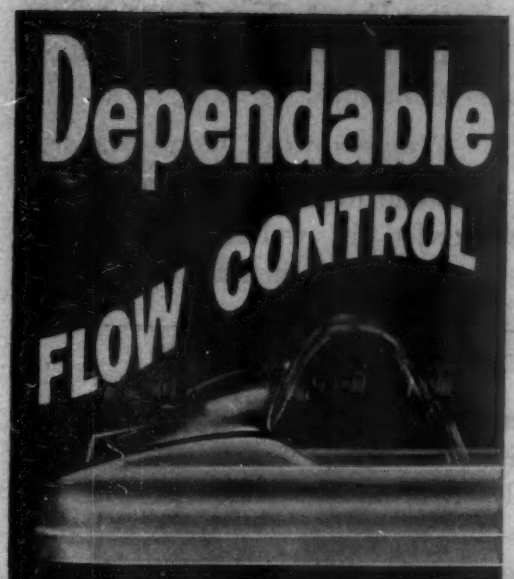
Insulation can easily be stripped from wire by dipping it in a liquid made by Aircraft Marine Products, Inc., of Harrisburg, Pa.

Progress with Conomatics

Libbey-Owens-Ford Glass Co. is making sound and heat insulating partitions of sealed double glass.

Conomatics for *Progress*

According to the Pittsburgh Bureau of Smoke Prevention the city has had 50% less smoke and 39% more sunshine during the last year.



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1. Dependable, automatic flow-control does away with spouting and splashing. No annoying water fluctuations. **2.** Smart, streamlined styling blends harmoniously into all surroundings. **3.** Effortless finger-tip pressure produces a steady stream of perfect-temperature drinking water. **4.** Temprite bubbler design gives maximum sanitary protection.

User Protected by 5-Year Warranty Plan

All models meet requirements of the National Bureau of Standards and Underwriters Laboratories, Inc.

Write for name of distributor in your neighborhood.

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TEMPRITE PRODUCTS CORP.

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YOU WANT TO KNOW

more about the items on this page

Letters to the addresses given will bring you further information.

FLOOR COVERING. Linoleum substitute is said to seal untreated concrete surface. Liquid. Gives linoleum-like finish to any coarse surface in one application. Pavinoleum, Inc., 342 Madison Ave., New York.

FOAM INSULATION, plastic. Flotofoam is said to be non-corrosive, non-toxic, self-extinguishing. Does not support mold or bacteria growth. Shredded, block, or slab. United States Rubber Co., Rockefeller Center, New York.

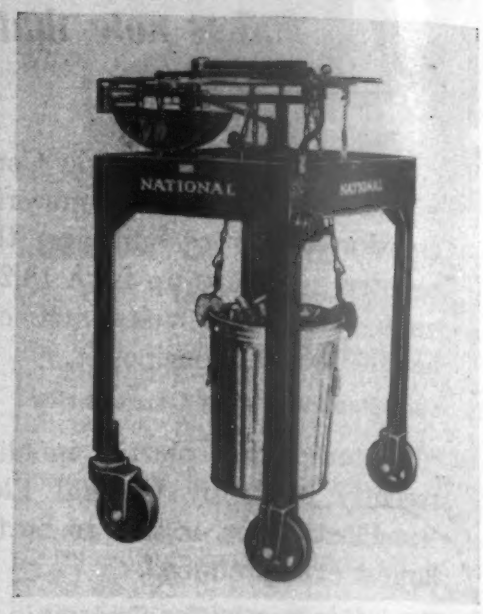
ANTI-STATIC SURFACE for plastics is provided by Acrawax C, powdered. Surface remains free of static changes, lint, dust. Glyco Products Co., 26 Court St., Brooklyn, N. Y.

ILLUMINATED MAGNIFIER. Electric-Loupe has 7½-volt bulb mounted above lens. Focal length of lens is 2 inches. Plastic headband. Lightweight transformer. Plugs into 110-volt outlet. L & R Mfg. Co., 577 Elm St., Arlington, N. J.

IDENTIFICATION CARDS with photograph etched in aluminum. Will last a lifetime. Contains physical description, blood type, social security and hospitalization numbers, telephone numbers, and addresses. Safeguards for authenticity. Universal Identification Service, 5003 U St., N.W., Washington, D. C.

INSULATED WIRE is 30 per cent smaller in diameter than conventional building wire of like gage. Called Neolay-Type RU. Sizes 14, 12, 10, 8, and 6. Nylon outer layer covers a layer each of natural rubber and neoprene synthetic. Resists gasoline, oil, fire, moisture, acids, light. United States Rubber Co., Rockefeller Center, New York.

STEEL STRAP KIT carries strapping tool, cutter, strap, and seals.



COUNTING & WEIGHING SCALES enable one man to handle bulky or heavy material. Scales are rolled over object. Hydraulic lift. Capacity, 1000 pounds. Weighing ratio, 200 to 1. National Scale Co., 43 Mill St., Springfield, Mass.

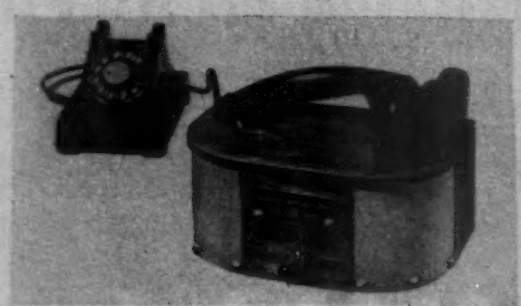
Strap is inserted through slit in end of steel case. A. J. Gerrard & Co., 221 North La Salle St., Chicago 1.

MATERIAL SELECTOR. Recommends construction materials for almost 400 different corrosive liquids and gases. Bulletin 97. Fischer & Porter Co., Dept. 4 Q-L, Hatboro, Pa.

TAPE MEASURE called Metro Measure. Stainless steel case, plastic window, direct-reading dial for inside and outside measurements. Leather case available. Dart Mfg. Co., Mason, Mich.

CARTON OPENER. Protects user and carton contents. Adjustable to carton thickness. Designed for heavy duty. Flash Box Opener Co., Inc., 52 West Houston St., New York 12.

CUTTING BLOCK of plastic. No grain. Will not chip or split under dies. Said to outwear wood. Can be



TELEPHONE AMPLIFIERS. No mechanical connection to telephone. Adjustable volume. Incoming and outgoing voice audible. Plug into light outlet. Tel-O-Aid (left), Wagner-Metcalf Corp., Glendale 4, Calif. Simplophone (right), Intercontinental Inventions Management Corp., 60 East 42nd St., New York 17.

ALL-PURPOSE UNOBA GREASE SIMPLIFIES ALL YOUR LUBRICATION!

1. **UNOBA**—the sensational grease developed by Union Oil Company—is the first all-purpose grease in history that resists both heat and water! That's why this *one* grease performs the jobs that formerly required many different types, grades and brands of greases!

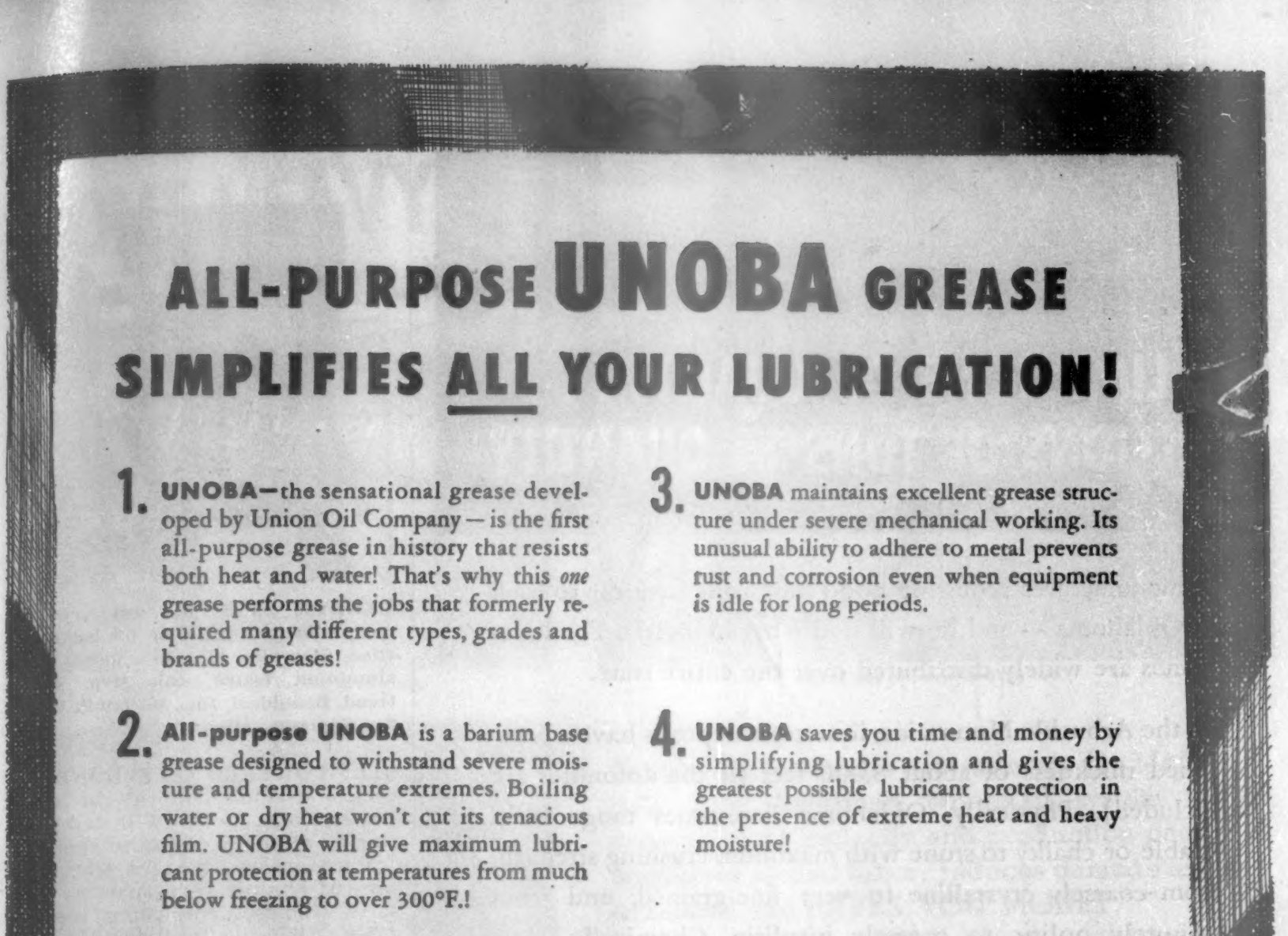
2. **All-purpose UNOBA** is a barium base grease designed to withstand severe moisture and temperature extremes. Boiling water or dry heat won't cut its tenacious film. UNOBA will give maximum lubricant protection at temperatures from much below freezing to over 300°F.!

3. **UNOBA** maintains excellent grease structure under severe mechanical working. Its unusual ability to adhere to metal prevents rust and corrosion even when equipment is idle for long periods.

4. **UNOBA** saves you time and money by simplifying lubrication and gives the greatest possible lubricant protection in the presence of extreme heat and heavy moisture!

For full information phone your local Union Oil Representative or write Sales Department, Union Oil Company, Los Angeles 14, California.

UNION OIL COMPANY
OF CALIFORNIA



A manufacturer requiring good limestone has only to look at Oklahoma - - and he will find what he needs. For limestones are widely distributed over the entire state.

In the Arbuckle Mountains, limestone deposits have a combined thickness of about 8,000 feet (if the dolomites are included). Physically, Oklahoma limestones range from friable or chalky to stone with maximum crushing strength; from coarsely crystalline to very fine-grained; and from minutely oolitic to coarsely pisolitic. Chemically, they range from impure stone suitable for woolrock to chemical grade.

Oklahoma limestone is being utilized extensively for many purposes. Its quality and availability merit consideration for a multitude of additional uses.

TYPICAL ANALYSIS
(26 feet)

	Percent
CaO	54.760
MgO	0.680
SiO_2	0.143
Fe_2O_3	0.074
Al_2O_3	0.174
P_2O_5	0.007
SO_3	0.008
Ignition loss	43.940
Total	99.786

Detailed information on Oklahoma's mineral resources is available on request, based on data by the Oklahoma Geological Survey. Map showing location of mineral deposits is also available.

molded in any color or shape in various degrees of hardness. United States Rubber Co., Rockefeller Center, New York.

LADDER STEP fits any standard rung ladder. Adjustable for ladder incline. Step size, 11¼x10⅜ inches. Cast aluminum frame, oak step, safety tread. Beauideal, Inc., 867 South Water St., Saginaw, Mich.

SELF-POWERED TELEPHONE. Operates without batteries or other power connections. Will talk and ring up distance of 20 miles. Designed for use where standard telephones present hazards from sparking contacts. Handset and ringer case of plastic. Wheeler Insulator Wire Co., Inc., Waterbury, Conn.

INSULATING MATERIAL. Santocel is free-flowing, silica aerogel powder. Monsanto Chemical Co., 1700 South Second St., St. Louis 4.

HARDNESS TESTER for Rockwell testing. Designed for testing surfaces that must not be marred. Depth of penetration is held to limits of 0.005 inch or less. Clark Instrument, Inc., 10200 Ford Rd., Dearborn, Mich.

RECORDED CASE STUDIES in human relations. Records are 12-in. unbreakable vinylite. Used as discussion springboards. For training programs, conference groups, counseling programs. Training Services, Inc., 633 North Water St., Milwaukee 2.

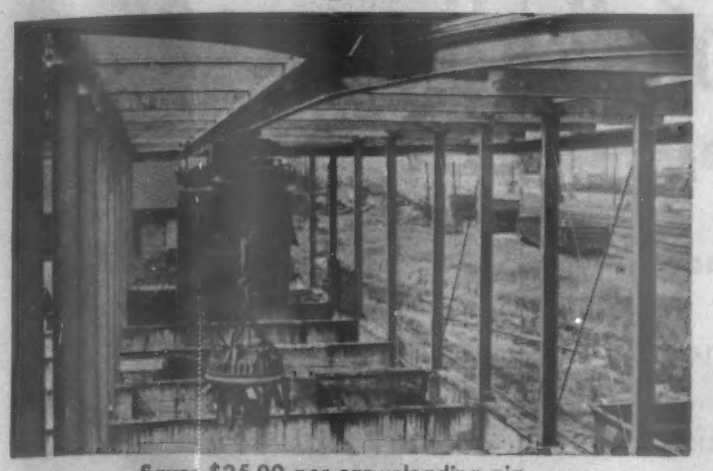
HEAT FATIGUE PILLS made in butterscotch candy form. Contain two body salts, sodium chloride, dextrose. Individually wrapped. Benson Laboratories, Inc., Bessemer Bldg., Pittsburgh.

INDUSTRIAL HYGIENE Newsletter. Issued monthly by Federal Security Agency, Public Health Service. Rate—$1 a year (domestic). Superintendent of Documents, Government Printing Office, Washington.

DECORATIVE MATERIAL combining plastic with paper or cloth. For walls, furniture, desks. Satusply is made in 34 colors and patterns. Several widths and thicknesses. Con-

MOVE HEAVY LOADS ON MONORAIL

FOR LOWER COST HANDLING



Saves $25.00 per car unloading pig.

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Delivers metal with 60% less labor.

Increased tonnage of steel handled.

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Any system, regardless of how complicated, will pay for itself in time and money saved. One company reports a savings of 86% in handling costs.

Whatever your handling problem may be, there is an American MonoRail system adaptable to it. From the simplest hand-operated unit to the most complicated fully automatic system, American MonoRail engineers can suggest a system best suited to your problem.

SEND FOR BULLETIN C-1. A 56-page book showing successful applications of American Mono-Rail Systems.

THE AMERICAN MONORAIL COMPANY

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GOOD ENGINEERING is the shortest path between two points

Probably you have never considered *Engineering* in this respect, but, in the manufacturing end of any business, engineering can be the determining factor between a safe cost figure and a competitive selling price. There are many steps in producing a product for market. Any one of these steps might be the "road block" in your planning for profit. From product design, through production methods and quality control of the finished item it is our business to establish the shortest path—the best way—to profitable manufacturing. We urge you to become better acquainted with our service and organization through our brochure . . .

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tinuous rolls. United States Rubber Co., Rockefeller Center, New York.

THICKNESS GAGE for thin films. Uses radioactive isotope. Will gage continuously. No mechanical contact. Accurate to a hundred-thousandth inch. Goodyear Tire & Rubber Co., 1144 East Market St., Akron.

ROTARY CARD FILE, Master Cardineer, is hand or motor-powered. Controlled by hand-button or pedal. Records revolve in either direction. Holds up to 11,000 records in 3 square feet of space. Diebold, Inc., Canton 2, Ohio.

FILMS

Fork-truck pallet operation. Fork trucks in bag-handling operation. Black and white, 250 feet. The Mercury Mfg. Co., 4044 South Halsted St., Chicago 9.

Electric trucks serving industry. Platform, fork, and ram trucks at work. Black and white, 550 feet. The Mercury Mfg. Co., 4044 South Halsted St., Chicago 9.

Opportunity, the story of the best location in the nation. Documentary on the Cleveland-Northeast Ohio area and its desirability for industrial production and distribution, and for management headquarters. Both 16- and 35-mm. sizes, black and white, sound, 18 minutes. The Cleveland Electric Illuminating Co., 75 Public Square, Cleveland 1.

Model M-A payloader. Black and white, 16 mm., silent, 18 minutes. The Frank G. Hough Co., 641 Killibrew, Libertyville, Ill.

Pacemakers of industry. Tells story of developments in field of materials handling from the time of the pyramids to the present. Running time, 20 minutes. Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4.

Never omit the "Composite Valve"

— in any cost-wise planning

CALL IT THE "COMPOSITE VALVE"—the giant that would result if *all* the valves in a plant were *one* valve. As pictured here, its proportion to other equipment in this detailed model of an automobile factory is fairly accurate. Representing your total valve investment, its size may surprise you, but it must be considered in any plan for economical plant operation.

IT PAYS to keep *your* "composite valve" in mind at all times . . . and thus avoid the common error of dismissing valves as a comparatively unimportant investment. With wages and material costs the highest ever, your total valve expense warrants the same careful attention that you give to operating costs of larger plant units.

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Jenkins Bros., 80 White St., New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal.

"PRACTICAL PIPING LAYOUTS" is a 32-page book containing diagrams and descriptions of 25 basic piping layouts with complete recommendations for valve selection and location in the lines. Tells you "which valve where for best performance". FREE on request. Write JENKINS BROS., 80 White Street, New York 13, N. Y.

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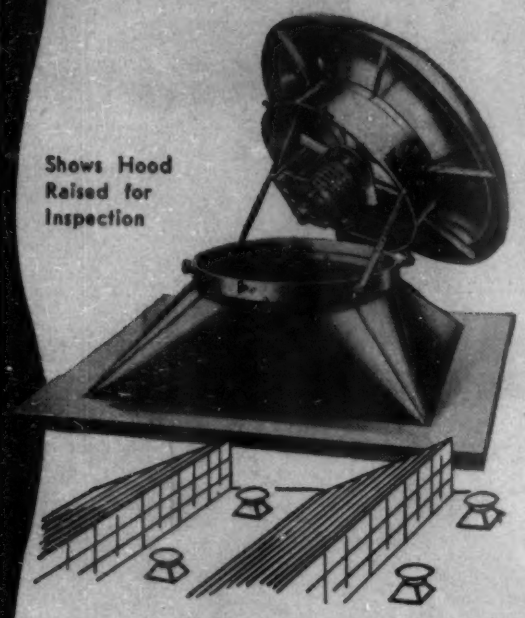
Types, Sizes, Pressures, Metals for Every Need

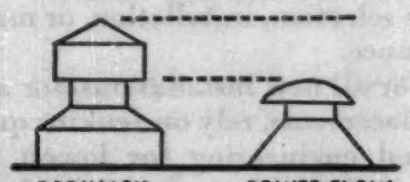
CONTROLLED VENTILATION
Regardless of Weather



Shows Hood Raised for Inspection

EASY ACCESS FOR MAINTENANCE
The DeBothezat Power-Flow Roof Ventilator is a motor driven fan in a weatherproof housing. It provides positive, *controlled* ventilation independent of variable weather conditions. This is a decided improvement over gravity-type ventilators which are dependent upon wind velocities and temperature differences. Non-overload power characteristic of fan keeps power consumption practically constant and prevents motor burn-out. Easy access to fan and motor is provided by hinged hood.

MODERN, STREAMLINED APPEARANCE



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Low in height, Power-Flow Roof ventilators are designed for attractive appearance as well as efficient ventilation. Light-proof at night to meet any possible blackout regulations.

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SIGNIFICANT LABOR DEVELOPMENTS

BENJAMIN WERNE, Adjunct Professor of Industrial Relations, New York University and a Member of the New York Bar

Period Surveyed: June 1 to July 1

TREND INDICATORS

Wage Hour

DISTINGUISH BETWEEN STATUTORY OVERTIME AND PREMIUM PAY

The Supreme Court has held that the obligation to pay time and one-half (statutory overtime) required by the Wage Hour Law for hours worked in excess of 40 in a regularly scheduled work week, has no application to premium rates paid for shifts, job differentials, or work on Saturday, Sunday, or holidays as such. The rule is that only those contract overtime rates that are based on performance of work in excess of a specified number of hours in a work day or work week may be considered as statutory overtime pay. Statutory overtime, the court stated, is an additional sum received by an employee because he had previously worked a specified number of hours in a work day or work week. (Bay Ridge Operating Company v. Aaron, USSC)

EMPLOYEES CLAIMING PORTAL-TO-PORTAL PAY MUST SHOW PROVISION IN CONTRACT

Where employees sue to recover payment for certain portal-to-portal activities, they must be able to show that the activity for which they sued was compensable by an express provision of a contract. The employees cannot claim that they are entitled to compensation because there was a contract between the employer and the union that merely designated these activities as working time since, in order to recover payment for these activities, the contract must contain an express provision calling for payment as required by Section 2 (a) (1) of the Act. (Millet v. Bethelem-Hingham Shipyard, USDC Mass.)

MAY NOT CLAIM PORTAL-TO-PORTAL PAY BECAUSE SUCH WAS INDUSTRY PRACTICE

Employees are entitled to payment for portal-to-portal activities where they can show that there has been a "custom or practice in effect, at the time of such activity, at the establishment or other place where such employee was employed covering such activity . . ." An employee cannot claim that he is entitled to payment for preliminary and post-liminary activities merely because it was the custom and practice in the industry to pay for such time. Such an allegation by the employee does not meet the jurisdictional requirements of the above quoted provision, Section 2 of the Portal-to-Portal Act, since the custom or practice must have been in effect in the employer's plant and the custom or practice may have existed in the industry without being in effect in the plant. (Bonner v. Elizabeth Arden, Inc., USDC S. New York)

CONSTITUTED GOOD FAITH DEFENSE

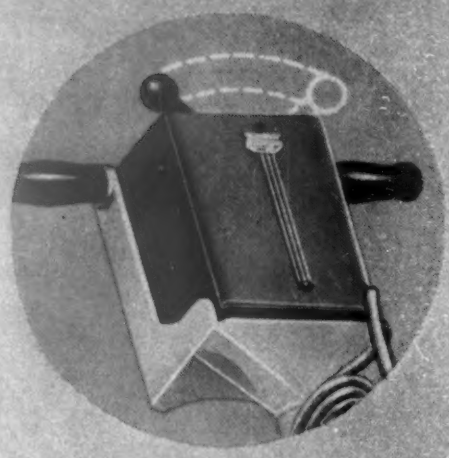
Where an employer classified employees as exempt in reliance on an approval by the Salary Stabilization Unit of the Treasury Department of salary increases to certain employees, his action will be considered to have been made in good faith. The approval by the SSU constituted an administrative "ruling" to the effect that employees were *bona-fide* executive, administrative, or professional employees. In approving the increases, the SSU necessarily decided that each and every one of these employees was employed in a *bona-fide* executive or administrative capacity and that each was properly classified as an exempt employee. "Such a ruling, thus relied on, constitutes, with respect to the period of time subsequent to the respective approvals, a defense within the meaning of Section 9 of the Portal-to-Portal Act of 1947." (Wells v. Radio Corporation of America, USDC S. New York)

WAGE AGREEMENT VALID

A wage agreement was upheld by the court where under the plan employees received a guaranteed weekly wage equal to the fixed hourly rate for the first 40 hours, plus time and one-half that rate for 8 hours and time and one-half the hourly rate for all hours above 48. Such a guaranteeed wage plan is valid, since the guaranteed wage equals or exceeds the minimums prescribed in the Act, the employees knew and understood the mechanics of the plan, and the plan gave to the employees a regularity and stability of employment. (McComb v. Pacific & Atlantic Shippers Association, USDC N. Ill.)

REST PERIOD HELD COMPENSABLE

Rest periods of less than 20 minutes' duration were held to be compensable time worked for the purposes of computing overtime under the Act. In holding that rest periods for piece-rate workers should be considered compensable activity under Section 2 of the Portal-to-Portal Act, the examiner said: "It is no longer open to doubt that rest periods as a general rule result in increased efficiency and production. The rest periods appear to have been so closely related to the strictly productive



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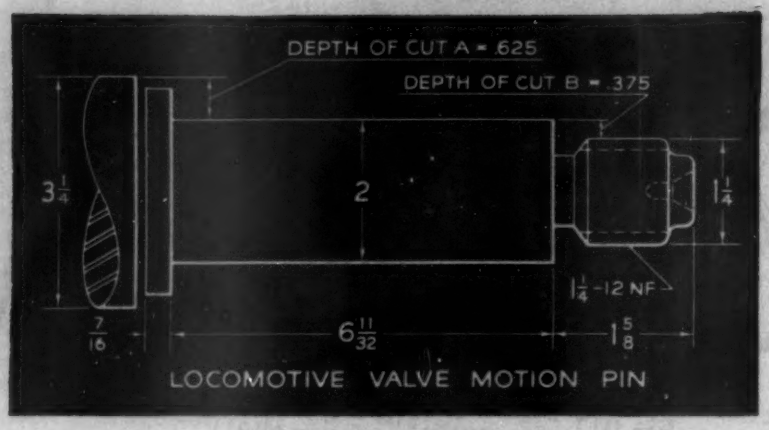

Take this locomotive part for instance . . .

Another typical example of effective power turning with carbide tools on a Jones & Lamson No. 7A-5 Saddle Type Turret Lathe.
Cut "A" produces the 2" diameter from 3¼" X-1315 bar stock at 220 FPM and .022" Feed. The total power required approximates 22 HORSEPOWER! Turn "B" produces the 1¼" thread diameter at a surface speed of 275 FPM and .022" Feed. The total power requirement approximates 17 HORSEPOWER. The complete valve motion pin is machined as shown, in 5.8 minutes floor-to-floor time — twice as fast as with high speed steel cutting tools.

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LABOR DEVELOPMENTS (continued)

activities of the piece-rate workers so as to form an integral part of the activities which unquestionably were compensable under Section 2 of the Portal-to-Portal Act." (Imperial Casket Company, Inc., and Charles D. Barr Jr., decision of Hearing Examiner Under Public Contracts Act)

PLANT GUARDS NOT ENTITLED TO PAY

Plant guards were not entitled to pay for time spent on plant grounds before and after their regular shifts, since the contract covering guards' employment provided for compensation on an 8-hour shift, thus excluding payment for time spent outside the shift. The employees cannot claim that the employer's practice of maintaining 24-hour guard established a custom within the meaning of Section 2 of the Portal-to-Portal Act. (Boulder v. Pressed Steel Car Company, Inc., USDC N. Ill.)

LABOR-MANAGEMENT RELATIONS

*EMPLOYER MAY PAY UNION OFFICIALS FOR TIME SPENT IN NEGOTIATING GRIEVANCES

Although Sec. 302 of the Taft-Hartley Act bars an employer from making payments to union representatives except for services rendered as his employee, an employer may pay union stewards and committeemen for time spent during working hours in negotiating grievances with company representatives. The arbitrator pointed out that "it is highly unlikely that Congress would want to interfere with a fairly well-established practice against which employers as a rule do not complain but have frequently agreed to recognize in collective bargaining agreements." (In re arbitration between Borg-Warner Corporation and United Automobile, Aircraft & Agricultural Implement Workers of America)

*EMPLOYER NOT GUILTY OF UNFAIR LABOR PRACTICE

An employer who sent a letter to his employees stating that all the employees who worked during a strike called in breach of the contract would receive an extra two days' pay for each day worked, was not guilty of violating the State Labor Relations Act. Since the strike was in violation of the contract, the company had the right to take action against this breach by the union, and its action is in accord with the principle that unlawful concerted activity is not entitled to the protection of the Act. "A strike in violation of a contract is within the condemnation of the principle, and a union which engages in such a strike may not complain of the em-

* In this classification, items marked with an asterisk also are considered to be trend indicators.

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This 16" Condor Compensated Belt is operating the main drive in a large southern lumber mill. Note the two large idler pulleys are putting considerable strain on this belt. However, when the photo was taken, this Condor Belt had already been in service 3 years. The pleased owners reported,

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LABOR DEVELOPMENTS *(Continued)*

ployer's countermeasures." (Macy & Company v. N. Y. State Labor Relations Board, NYSC)

***EMPLOYER HAS RIGHT TO EXPLAIN TAFT-HARTLEY TO EMPLOYEES**

An employer who was a party to a closed-shop agreement with the union was within his rights in sending a letter and a pamphlet to his employees which attempted to explain the Taft-Hartley Law and which contained such statements as that, under the Act, employees have the right to join or not join a labor union. The union contended that the company's action was a violation of the contract, that the letter created confusion in the minds of the employees and caused them to believe that they were no longer working under the provisions of the contract. After examining the letter and pamphlet, however, the arbitrator could find no violation of the agreement. (In re arbitration between Terre Haute Brewing Company and International Union of United Brewery, Flour, Cereal, Soft Drink, & Distillery Workers of America)

***TRANSFERRING WORK TO EMPLOYEES OUTSIDE UNIT**

Where the contract contains no clause vesting the employer with the right to transfer work from employees under the union's jurisdiction to employees outside the bargaining unit, an employer may not make such transfers without the union's consent. While the company contended that it is a prerogative of management to make such changes on the basis of sound business considerations, the arbitrator could not apply that principle to the present case, since it might be used to justify large scale transfers of work from the union's jurisdiction to non-union sources. (In re arbitration between Owl Drug Company and International Longshoremen's & Warehousemen's Union)

***EMPLOYER MUST SHOW CAUSE TO DEVIATE FROM SENIORITY ORDER**

Under a contract which requires that layoff and rehire be based on length of plant service, where skill and ability are equal, an employer who laid off an employee with greater seniority than another employee in the unit has the burden of proving that the laid-off employee was unable to perform the work satisfactorily. The arbitrator pointed out that the company is free to break the order on the seniority list where it can show cause for so doing because of differences in skill and ability. (In re arbitration between Bethlehem Steel Company and Industrial Union of Marine & Shipbuilding Workers of America)

***EMPLOYER HAS RIGHT TO ASSIGN JOB DUTIES**

An employer is not required to assign all the duties to an employee which are listed in his job descrip-

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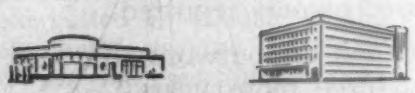

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tion, since the sole purpose of the description is to indicate the range of tasks which workers may properly be called upon to perform. (In re arbitration between Schultz Folding Box Company and International Printing Pressmen's Assistants' Union of North America)

***EMPLOYER MUST BARGAIN ON GROUP HEALTH AND ACCIDENT INSURANCE PROGRAM**

Where a union has been designated as the exclusive bargaining representative, an employer is required to bargain with it concerning a group health and accident insurance program. The board rejected the employer's contention that its contributions to such a plan are gratuitous payments for the benefit of employees and not "wages" as that term is used in the NLRA. In handing down its decision, the board cited the Inland Steel case in which it held that the terms "wages" and "conditions of employment," as used both in the NLRA and the amended Act, include pensions and insurance and that therefore the employer is under a statutory duty to bargain concerning them. (W. W. Cross & Company and United Steelworkers of America)

***DISCIPLINE UNJUSTIFIED**

An employer who for a period of approximately two years had accepted the fact that an employee, for one reason or another, had an antipathy to pushing a hand truck, cannot now discharge the employee for refusing to operate it. Since the employer in the past did not consider such action as sufficient to justify a discharge, the employee's present action in declining to operate the hand truck cannot be considered as cause for discharge. (In re arbitration between J. Marcus & Company, Inc., and Textile Workers Union of America)

***DISCHARGE HELD UNJUSTIFIED**

Although the contract vests in management the right to discharge for inefficiency, discharge was held unjustified where management failed to cite specific instances of inefficiency or to produce witnesses or production records to support its charge that incentive workers were unable to earn their incentive rate when the employee worked as their helper. While it is management's prerogative to determine what constitutes inefficiency, in determining inefficiency it must have facts upon which to base its conclusions. In the absence of such facts, its position is untenable. (In re arbitration between Gaylord Container Corporation and Retail, Wholesale & Department Store Union)

***EMPLOYER GUILTY OF REFUSAL TO BARGAIN**

An employer was guilty of refusing to bargain where he moved his plant to another city without notifying

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An alert appliance manufacturer, whose output of electric irons was tied up by a knotty production problem involving handles, would find that OSTUCO Tubing provides the answer in a sturdy, lightweight handle, easily and quickly assembled to the iron. With OSTUCO doing the angle cutting, bending, drilling and threading, the manufacturer could trade a difficult production operation for a simple, low-cost assembly job.

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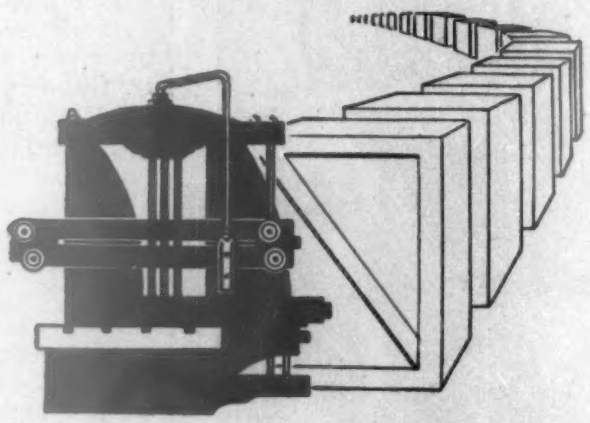
A manufacturer of turret lathes could step up productive output by using OSTUCO Tubing for the collets and spindles of his product. With OSTUCO Tubing, fabricated to his specifications, there'd be no time lost on the production line . . . productive output would soar, production costs would drop.



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the union of his intentions and refused on request to tell the union on the day after the move the name of the new company or the place at which operations were to be resumed. The board held that the employer's action was in effect an illegal lockout of the employees and a way of avoiding a scheduled bargaining conference with the union, which unlawfully deprived the union of the opportunity to bargain with the employer about the possible transfer of employees to the new location. In addition, the board found that the alleged "new" company was in all major and determinative respects the old one under a new name and in a new form. (Rome Products Company and Kenton Plastics Corporation and United Rubber, Cork, Linoleum & Plastic Workers of America)

***EMPLOYER MAY NOT SHUT DOWN PLANT AND CALL IT A VACATION**

Under a vacation clause which read: "Whenever possible vacations will be given at the time most desired by the employees . . . The customary vacation period will be during June, July, and August. . . . The employer, however, reserves the final right to allocate vacations," an employer may not designate a contemplated shutdown period as a mandatory vacation period for all employees. The last sentence of the above quoted clause which gives the employer the right to allocate vacations must be regarded as a right to veto particular vacation requests rather than the right to designate vacation periods. (In re arbitration between Curtiss-Wright Corporation and United Automobile, Aircraft & Agricultural Implement Workers of America)

***EMPLOYEES NOT ENTITLED TO HOLIDAY PAY**

An employer is not required to pay for holidays occurring after an extended period of layoff. Said the arbitrator, "In the field of collective bargaining these matters have come to be viewed frequently as a part of the wage bargain and structure. It does not follow, however, that holiday pay is due in all cases of extended layoff. Rather, it is implicit in the view of paid holidays as a part of the wage structure that they are linked to compensation for work performed." (In re arbitration between Babcock Printing Press Corporation and International Association of Machinists)

***BOARD MAY ORDER REINSTATEMENT OF SUPERVISOR**

Despite the fact that the Labor-Management Relations Act excludes supervisors from its coverage, the board may still order reinstatement with back pay of a supervisor who was discriminatorily discharged prior to the effective date of the Act. The board claimed that Section 14(a) of the Act "is prospective in operation and nothing in its text or its legislative history suggests a congressional

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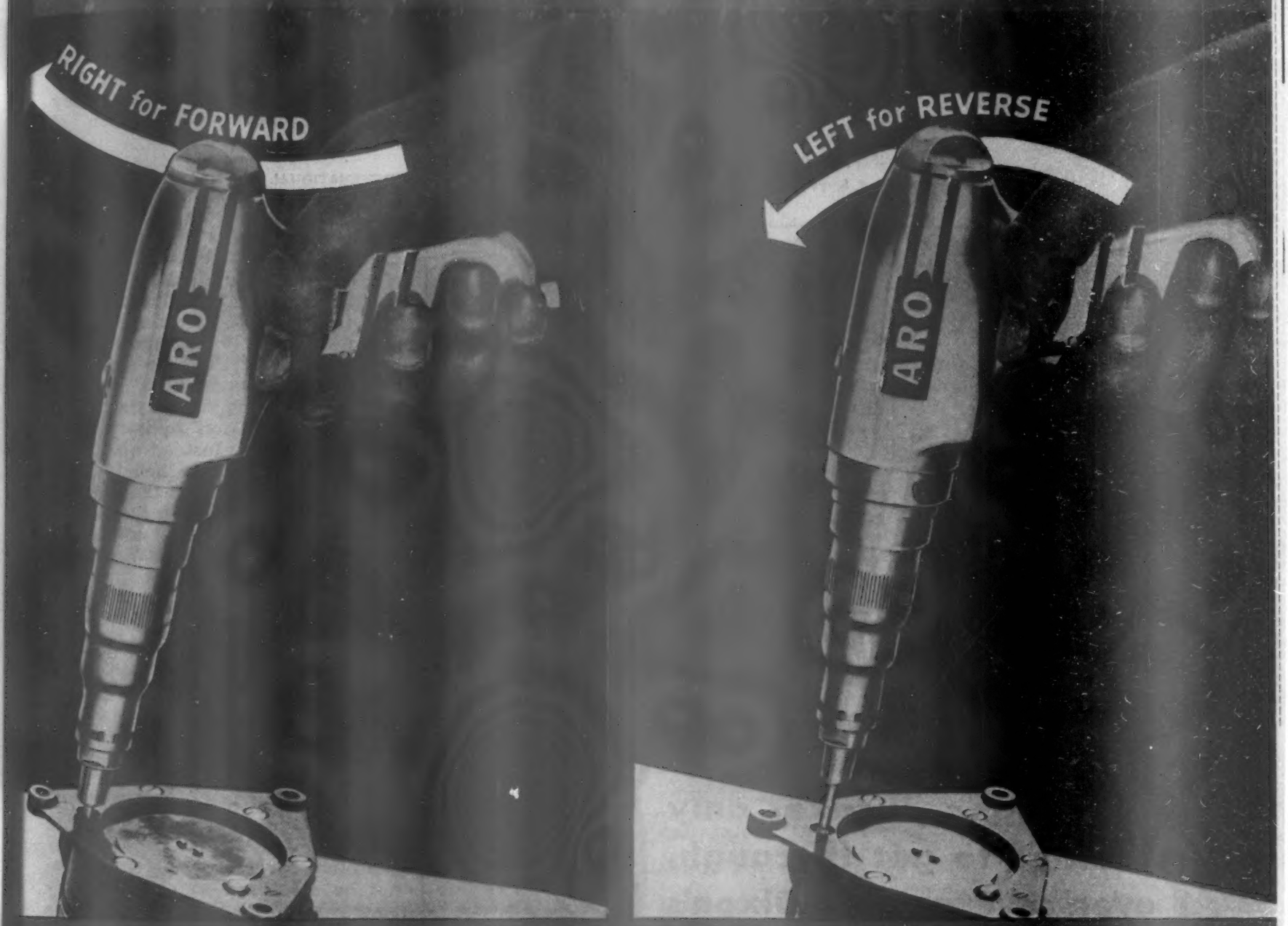

Save time... Increase Production

You can change instantly from forward to reverse —just turn button on rear of motor housing.

This new tool, Model 7091, has big power and high driving torque—ideal for No. 1 to 14 machine and wood screws and ¼" nuts. Has adjustable friction clutch. Low working speed of 750 r.p.m. insures perfect contact with screw slot and prevents marring of screw heads. New housing design gives perfect balance . . . ease of handling. Feature by feature—it's one of the finest Aro Tools ever built! Ask your Aro Jobber.

SEND COUPON FOR MORE DETAILS!

ARO
AIR TOOLS

THE ARO EQUIPMENT CORPORATION, Bryan, Ohio

Without obligation, send us your illustrated bulletin on the new Aro Model 7091 Reversible Screw Driver and Nut Setter.

Name.....

Street.....

City..... State.....

REDUCE PRODUCTION COSTS—F.O.S. Tape is handy, versatile, inexpensive. Simplifies production in *many* ways . . . Stays put—but can be removed quickly without requiring "cleanup." Let SEAMLESS analysts show you how to save time and money with F.O.S. No obligation! . . . *Write today for samples and prices.*

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I call Dixon's the SPEED dressing . . . it takes only seconds to get thorough, even coverage. Try Dixon's and you'll never use another dressing!
DIXON'S
SOLID
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SOLD BY SUPPLY HOUSES EVERYWHERE

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LABOR DEVELOPMENTS *(continued)*

intent to absolve employers of past violations of their duty to supervisors." (Republic Steel Corp., and Foreman's Association of America)

***UNION'S FAILURE TO CHALLENGE LAYOFF CONSTITUTED ACQUIESCENCE**

Where a union failed to challenge the layoff of certain employees until three months after it occurred, its action will be construed as acquiescence in the layoff so as to bar an award of back pay. In re arbitration between Hanscom Baking Corporation and Bakery & Confectionary Workers' International Union of America)

***INTERNATIONAL MAY NOT FILE PETITION ON BEHALF OF LOCAL**

The board dismissed a representation petition which was filed by a complying international union on behalf of a non-complying local. The board found that since the constitution of the international stated that "all contracts shall be in the name of the local union and shall be signed by the local union committee," it seems unlikely that the international was seeking certification to bargain on its own behalf. Instead the international was acting in behalf of the local union, which was the only entry authorized to contract. (United States Gypsum Company and United Gas, Coke and Chemical Workers of America)

***CLAUSE DEFINING REGULAR WORK WEEK IS NOT GUARANTEE**

The purpose of a clause in the contract which provides that "employees shall work a regular work week of 40 hours per week and 5½ days per week" is to define the regular straight-time work week. Such a clause may not be construed as a guarantee that employees will receive an opportunity to work 5½ days in every week. "An ordinary collective bargaining agreement cannot be construed as obligating the employer to provide work. The guaranteed wage may be a laudable objective, but it must be obtained through collective bargaining or its aftermath; it cannot be obtained by indirection via the arbitration of a grievance." (In re arbitration between International Window Cleaning Company and Building Service Employees International Union)

***REOPENING CLAUSE DOES NOT JUSTIFY ARBITRATION**

A reopening clause which merely states: "Either party may reopen this wage provision on June 1, 1947, upon 30 days' notice by registered mail to the other," does not justify a direction to arbitrate wages. The union cannot claim arbitration under a general arbitration clause, since the clause does not specifically provide for arbitration of wages upon reopening of that question. (In re McCarten, NYSC. Special Term, Part II, N.Y. County)

New kind of bushing stock . . .
***your key* to new savings!**

HERE'S WHY. Shenango-Penn tubular bushing stock is *different!* It's *centrifugally* cast! Now, in a complete range of stock sizes, ready for immediate delivery, Shenango-Penn bars offer you those *same* money-saving qualities that make Shenango-Penn a preferred source of supply for special bearings, bushings and sleeves that must withstand the toughest kinds of service.

ADVANTAGES. The Shenango-Penn *centrifugal* method produces pressure-dense bars having exceptionally fine grain, higher tensile strength, finely divided and uniform lead dispersion, greater elongation, and *complete* relief from sand inclusions and blow holes. So naturally you can count on fewer rejects, excellent bearing load distribution, superior wear-life, and less chance of breakage or distortion in service.

FREE BULLETIN. Send for Bulletin No. 145 containing additional information and the complete list of standard, conveniently stocked sizes. These bars are ready now to give you that big *extra* margin of safety, service-life and over-all economy.

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PROTECTS MACHINERY KEEPS PRODUCTS PURE

Constant power . . . tremendous surface strength . . . no "dead spots" . . . that's your insurance against tramp iron damage to equipment or contamination of products. The Dings Perma-Pulley is completely automatic and trouble free . . . just install it and forget it. *New* Bulletin gives complete details.

For extra heavy burden depths, use Dings Electromagnetic Pulleys. Whatever your requirement, Dings has the best magnet for the job, either electro or permanent. Write today.

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Dings
"HIGH INTENSITY"

THEY SAY AND DO

LIGHTING CONTEST OPEN TO OWNERS, USERS

One important change in the official rules for the $1500 Merit Award Competition, sponsored by the Third International Lighting Exposition, makes it possible for owners and users of industrial and commercial lighting equipment to compete for honors and awards.

Requests for application blanks and copies of official rule books should be addressed to Merit Award Committee, 326 West Madison Street, Chicago 6.

The Exposition opens on March 29, 1949.

MANPOWER SUPPLY IS STILL SHORT

The manpower supply is almost as tight as during the wartime peak, stated a United States Employment Service report recently.

The Service said in its monthly publication that this "peacetime job bonanza" was created by the present unusually high level of industrial activity.

Four important changes in the character of the labor market since the end of the war in 1945 were listed:

Demand for skilled workers is now the greatest in the construction industry, and the demand for trained scientific specialists has created a "manpower famine" in science fields.

Concentration of labor has shifted from the coastal shipbuilding centers of wartime back to the Great Lakes, New England, and Middle Atlantic regions.

Apprentice and seniority standards relaxed during the war have been reestablished and are being rigidly enforced.

Men are replacing the women who held many skilled and semi-skilled jobs during the war years.

PUBLIC BELIEVES PROFITS ARE HIGH

Only one-quarter of the nation's population believes that company profits average less than 10 cents on the dollar. According to government figures, such profits are less than 10 cents on the dollar even in a year of high profits. This information was determined by a survey carried out by the Psychological Corporation. Persons in 48 cities from coast to coast were interviewed.

Sixty-two per cent said they thought companies ought to earn from 10 to 60 cents on every dollar of goods sold. This is more than companies are actually making today, the Corporation stated. Twenty-four per cent of those interviewed said they believed companies keep under 10 cents per dollar as profit; 37 per cent, 10 to 29 cents; 29 per cent, 30 cents and over, and 10 per cent were uncertain.

UNION MEMBERSHIP DOUBLES IN TEN YEARS

Membership of American labor unions rose from 6,394,600 in 1937 to 14,280,400 in 1947. This information comes from Prof. Leo Wolman of Columbia University, who is carrying on research into industry for the National Bureau of Economic Research. A preliminary report released recently by the Bureau states that the growth of American unions was influenced by the founding of the Congress of Industrial Organizations, by modifications in national labor policy and legislation, and the economic expansion since 1939.

JOINT CLINIC PROPOSED TO BOOST PRODUCTIVITY

CHARLES LUCKMAN, President, Lever Brothers Company, speaking before the American Management Association

It has already taken us 20 years to get labor and management to sit down together at the bargaining table. So far, that table has been a square one. It has a side for management and it has a side for labor. We need to eliminate the sides from our national bargaining table. We must substitute in its place a *round table*, around which the unity and togetherness of all elements in our economy can be allowed to function properly, for the benefit of all the people.

I propose that we create a joint productivity clinic. We should launch the work of this clinic along completely practical lines. This is not the time for abstract theories. The approach to this business problem must be made in a businesslike manner:

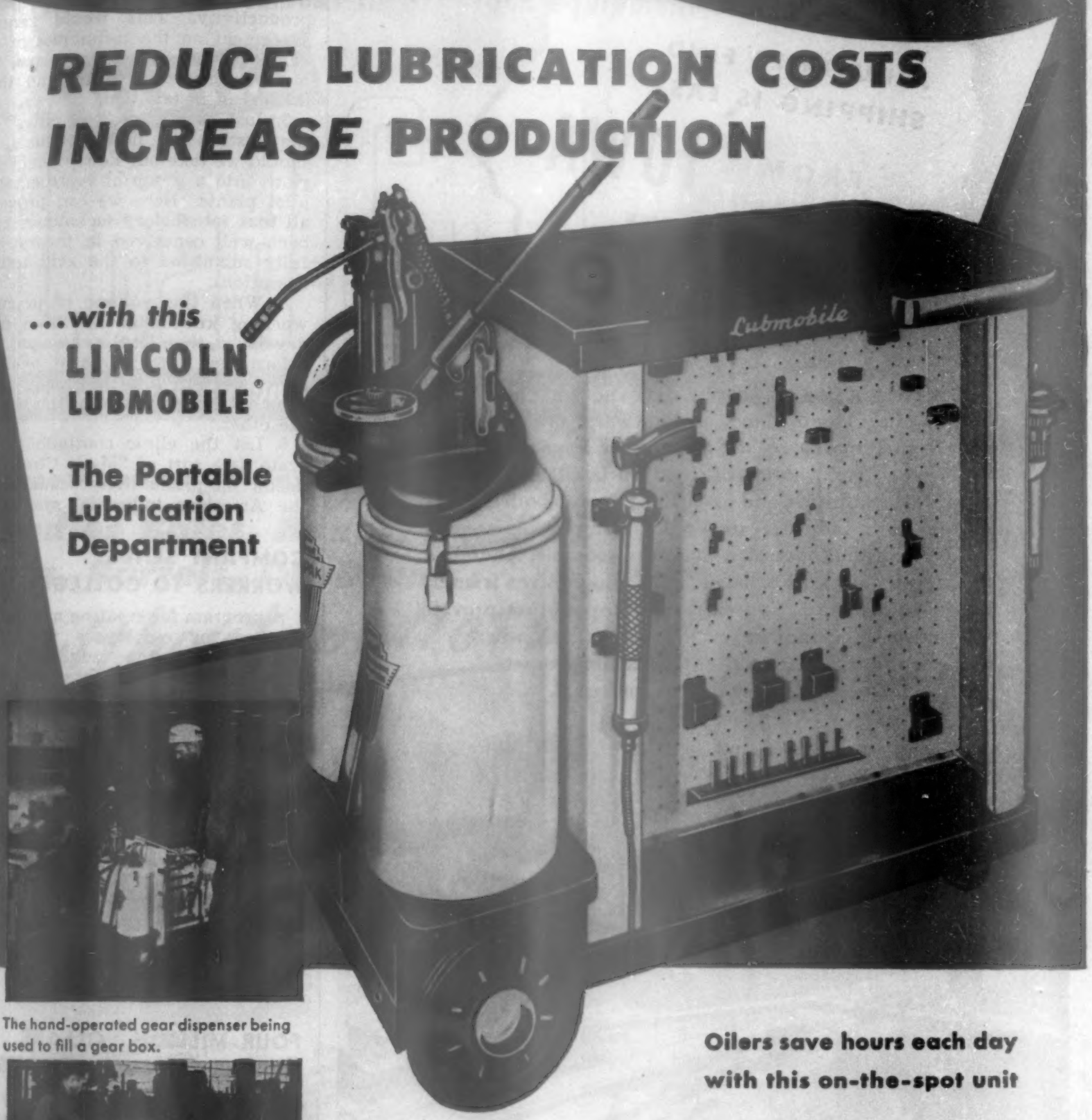
1. This clinic should run some full-scale market research on the problem of productivity. We must find out what labor and management think about present techniques for trying to increase productivity. This vital area of opinion research has, up to now, been neglected. Yet we in business wouldn't dream of introducing new products without spending hundreds of thousands of dollars to find out what our customers think. Before introducing new plans to labor and management, let us find out what they both really think.

2. Let the clinic arrange a conference of the leaders of labor and management. This group should be assigned the task of formulating the methods and procedures we

REDUCE LUBRICATION COSTS
INCREASE PRODUCTION

...with this
LINCOLN®
LUBMOBILE®

The Portable Lubrication Department



The hand-operated gear dispenser being used to fill a gear box.

The air-motor operated grease gun being used to lubricate bearings.

Oilers save hours each day with this on-the-spot unit

This complete portable lubrication department gives your oiler everything he needs—when and where he needs it. No time is lost going back to the supply room for special greases, tools, or grease guns. The All-in-One Lubmobile is another Lincoln answer to industry's problem of cutting costs through proper maintenance.

Lincoln manufactures lubricating equipment exclusively—from grease fittings to centralized lubricating systems.

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Lincoln is the originator of the Kleenseal Surface Check Fitting —the modern fitting with the ball in the top that seals out dirt.

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SHIPPING IS EASY
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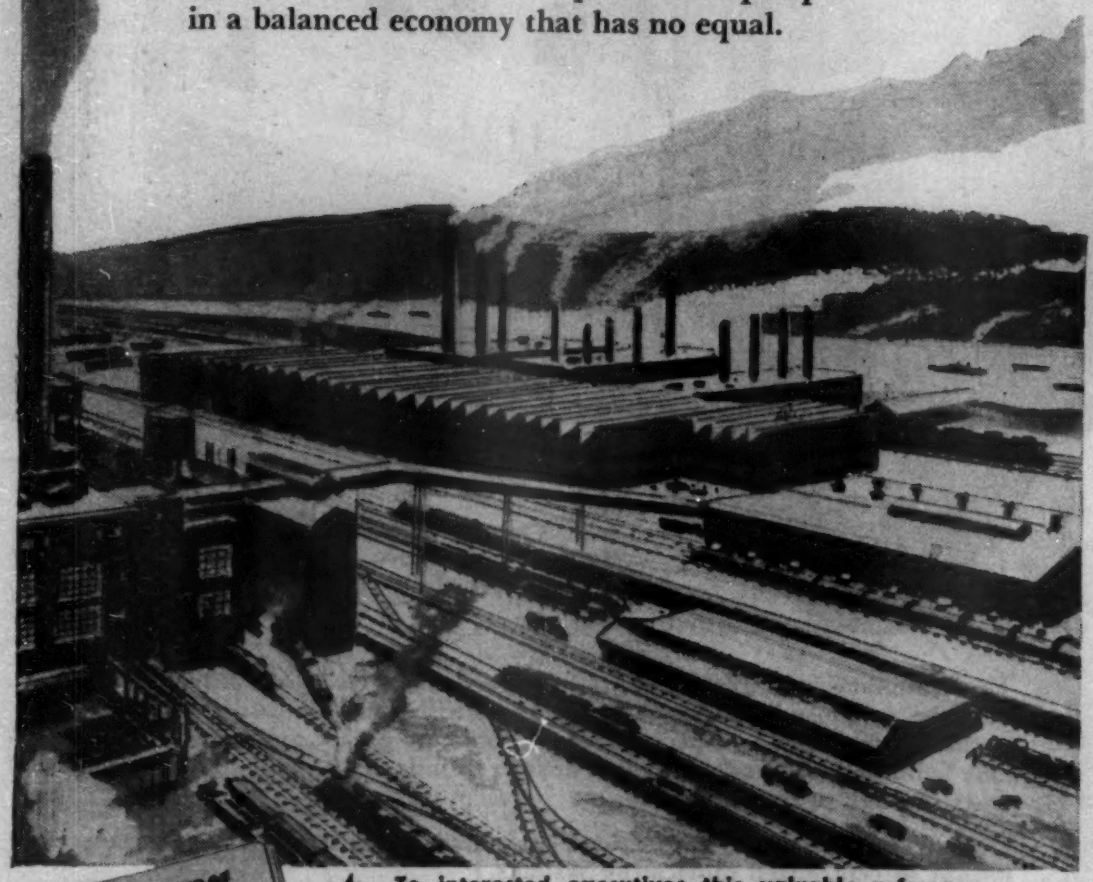
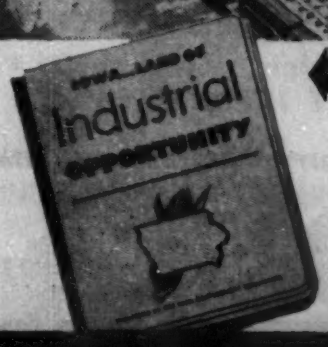
TO THE NORTH, SOUTH, EAST OR WEST, Iowa offers every type of land, air and water shipping to all the great markets of the Middlewest. Expanded airline systems, 9,679 miles of hard surfaced roads, 8,773 miles of railroads, and navigable rivers on both borders, give Iowa industries unexcelled transportation.

You'll find operation in Iowa profitable. Abundant supplies of skilled labor . . . progressive, friendly government . . . and modern transportation provide golden opportunities in the Corn State, where agricultural and industrial production prosper in a balanced economy that has no equal.





To interested executives this valuable reference book containing a complete picture of industrial opportunity in Iowa is available upon request. Included are vital statistics on population, existing industry, agriculture, raw materials, markets, transportation, and living conditions. Write for your free copy now and see how you can profit by bringing your plant to IOWA! Address 774 Central National Bldg., Des Moines 9, Iowa.

PRODUCT OF IOWA

Iowa's new official Trade Mark which identifies the fine products of Iowa farms and factories.

IOWA DEVELOPMENT COMMISSION

should employ to secure increased productivity. This would require agreement on the techniques of developing wage incentive plans, the basis for selecting them, and their method of installation.

3. Just as we use "test cities" for the testing of new products, so should we take our newly developed plans into a group of representative pilot plants. Here we can prove to all that satisfactory techniques have been well conceived in theory, and fully submitted to the acid test of operations.

4. When this volume of practical working knowledge has been fully developed, then let the clinic put that information into *words of one syllable*, and sell it to labor and management from one end of the land to the other.

5. Let the clinic continue to operate as a sort of "Mayo Clinic," to doctor the productivity headaches of the American industrial system.

COMPANY SENDS WORKERS TO COLLEGE

A program for creating new opportunities for employees who have been denied the advantages of advanced education has been announced by The Heintz Manufacturing Company, Philadelphia, a producer of sheet metal assemblies.

According to the company president, William J. Meinel, selected employees will be sent to college for a term of intensive courses. They will be paid their regular salaries or wages as though they were at work every day. When courses have been completed, they will return to their jobs, where it is presumed they will be equipped to make progress that otherwise might not ever have been possible.

FOUR MILLION DOLLARS FOR 100,000 SUGGESTIONS

General Motors Corporation's factory workers throughout the country have submitted 100,000 acceptable suggestions in the operation of their jobs. Awards totaling $4,000,000 have been granted. The GM suggestion plan has been in effect six years on a company-wide basis. Suggestions of a highly varied nature have been made, based upon either a change of equipment, procedure, or both. Some lighten work, some save material, some make the jobs safer, and others effect a time-saving.

The maximum award under the plan is $1000 for any one suggestion. A great many maximum awards have been made. Two employees have won $1000 awards twice during a one-month period. More than 25 per cent of all suggestions submitted received cash awards.

"Greatest advancement in lift truck equipment since pneumatic tires"

HYSTER Load-Grab

for use with HYSTER "20" and HYSTER "40" LIFT TRUCKS

"LOW-PRICED • SIMPLE • EFFECTIVE • FAST"

Handles Bales, Boxes, Bundles, Bags, Barrels, Oil Drums...

without pallets

CLOSED POSITION

By the simple manipulation of a lever, the operator can expand and contract the Load-Grab Arms from the closed 17 in. position to the wide-open position of 62 in. on the Hyster "20" and 66 in. on the Hyster "40".

WIDE-OPEN POSITION

what it is...what it does... Hyster Load-Grab is a simple, sturdy, hydraulically operated clamp device, with several different types and options of load arms. Load-Grab picks up any kind of a load as easily as you pick up a handful of cards.

how it does it... Hyster Load-Grab *side squeezes* with just enough pressure to lift and transport loads without the use of pallets . . . **Regular Load-Grab Arms, Rubber Faced Arms, Spike Faced Arms, Drum Handling Arms and Pallet Load Arms can be interchanged or installed in a few minutes.**

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Tough nuts are sweet meats for Orangarench!
You, too, can have the strength of an orangoutang when you tackle tough jobs with one of the many heavy-duty industrial wrenches made by Plomb Tool Company. With these tools you can "swing" from job to job with the greatest of ease, because rugged designs and extra-tough steels make them safe and long-lived. Accurate broaching, offset heads, strong box walls and other features make these wrenches your best buy. Get them from your dealer. He'll have the ones you want because
Tools you need—we make!
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Box and Spud End Wrench
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BEHIND THE BYLINE

Facts About *Factory's* Authors

David E. Pierce (page 78) studied chemical engineering at MIT after graduation from the College of Wooster, Ohio. His engineering experience consists of seven years with Du Pont, three with Atlantic Refining, fifteen with Rohm & Haas, and six with General Aniline & Film Corporation. He has written a book, "Chemical Engineering for Production Supervision," McGraw-Hill, 1942, and several papers for the Transactions of the American Institute of Chemical Engineers. In the Institute, he served as a director and as chairman of the committee on admissions. For many years he's been a member of the American Chemical Society.

A. H. Ranger (page 92) is a Down-Easter. He worked in construction and maintenance at Bethlehem Steel Company. After World War I he helped recondition the steamship Leviathan, then worked on construction and maintenance of office buildings in New York. He is now doing the same job for the Mack Truck Company in Plainfield, New Brunswick, and on Long Island. Ranger holds a private pilot's license and owns a BT-13 Army surplus plane. Long trips requiring navigation are his specialty.

Earl F. Riter (page 102) studied economics and business administration at Ohio University. In 1935 he began work in the Cleveland plant of The Glidden Company in the lacquer department. In 1940 he was named assistant to technical director of the paint and varnish division, and in 1942 was assigned to headquarters in charge of raw material control systems. In 1944 he was named assistant to the general superintendent of the paint and varnish division and assigned to production problems. Later

Cost Saving REZNOR

GAS FIRED UNIT HEATER

ZEPHYRS OF SUMMER AIR

ABUNDANT WINTER HEAT

You enjoy the pleasantness of summer warmth when the big, quiet fan of the Reznor unit dissipates its sultry heat. The same generous circulation will flood your rooms with comforting heat when winter comes.

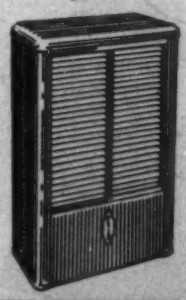
AUTOMATIC COMFORT

The REZNOR gas fired unit heater ends the costly efforts of heating with outmoded systems . . . REZNOR is "automatic." It performs throughout the heating season without attention. Small space occupants and factory employees work in comfort under the REZNOR'S even heat.

PREPARE NOW FOR THE COMING HEATING SEASON

There is still time to convert your office and plant to REZNOR automatic heating before cold weather comes. Have a REZNOR representative estimate the requirements of your building. Write today for details.

REZNOR
Gas fired unit heaters



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A SIZE FOR EVERY NEED

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MERCER 6, PENNA.
Gas Heaters Since 1888

NO BOILERS · NO STEAM LINES
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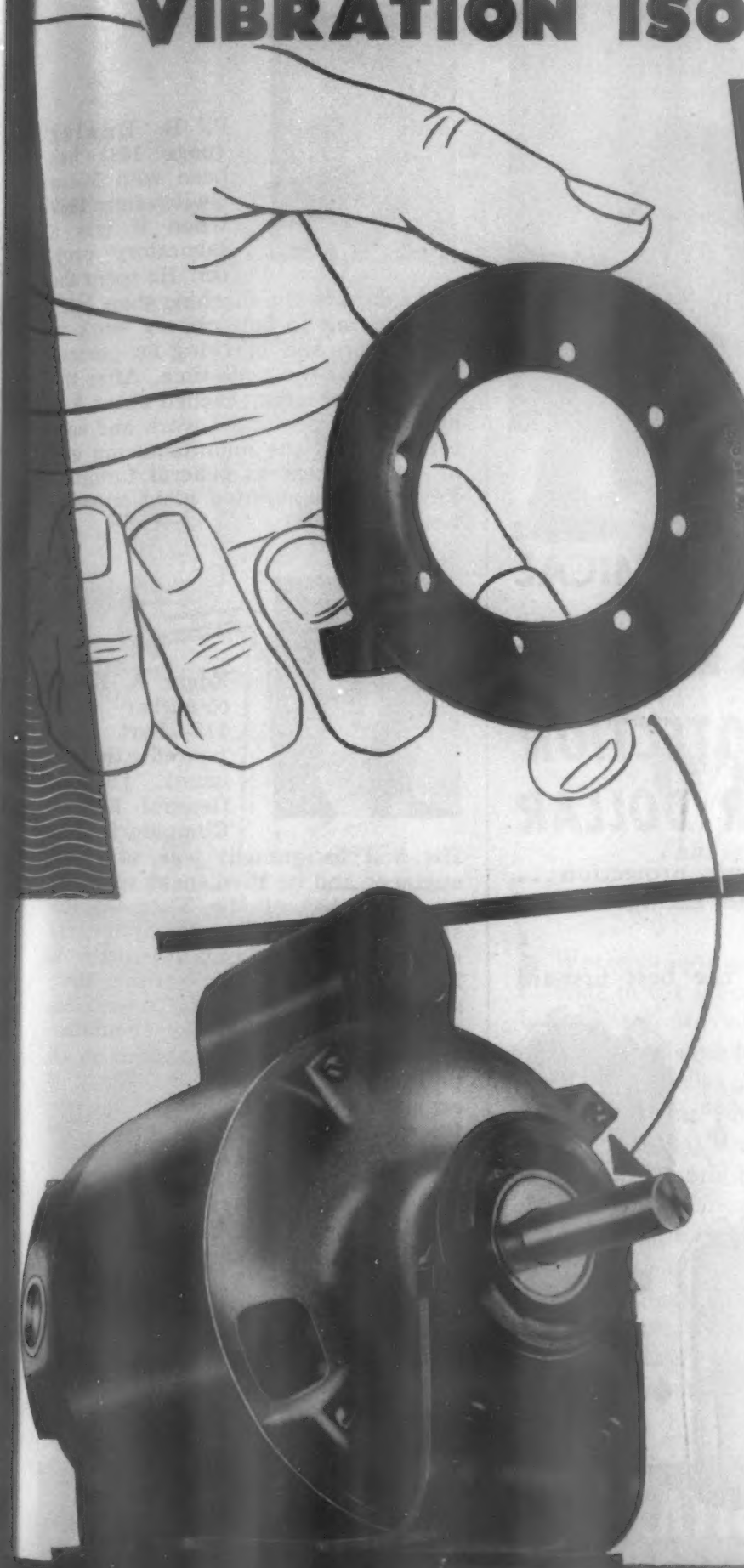
Burke Electric *Gets* VIBRATION ISOLATION

with the NEW

LORD FHP Motor Mount



BURKE Electric Company was on the alert to take advantage of the improved performance made possible by the new Lord FHP Motor Mount. It is standard equipment on resilient base models of ¼ and ⅓ hp. capacitor motors.

No bolts, nuts, straps or special tools are required to install this mount. Since it is readily clipped into place, assembly lines move faster, and production costs are reduced. The mount fits N.E.M.A. standard bases.* It provides excellent torsional vibration isolation and in addition has sufficient vertical and horizontal softness to reduce vibration in these directions also. At the same time it maintains adequate resistance to belt pull.

The Lord FHP Motor Mount is neat, compact, efficient . . . it raises previous standards of performance for FHP motors. Write for full details.

** For details on motor base see N.E.M.A. Publication No. 47-121 for Small H. P. Motors—Sect. MG8—Page 753 Dated Oct. 1, 1946.*

LORD

Vibration Control

WITH THE MASTER OF FLAME ANSUL FIRE EXTINGUISHING EQUIPMENT DRY CHEMICAL

FIRE EXTINGUISHERS

MORE AND BETTER FIRE PROTECTION FOR YOUR FIRE EXTINGUISHER DOLLAR

Ansul Dry Chemical Fire Extinguishers give you more protection . . . pound for pound . . . dollar for dollar . . . than any other extinguisher of comparable size.

In addition . . . Ansul Fire Extinguishers provide the best first-aid protection:

- For paint spraying and dipping operations.
- For hazards involving alcohols, solvents, gasoline, oils, asphalts and greases.
- For electrical equipment hazards.

Ansul Fire Extinguishers have the highest ratings for effectiveness on flammable liquid fires, based on tests conducted by nationally recognized approval agencies. The longer range stream of dry chemical is effective in winds and drafts.

After use, Ansul Dry Chemical Fire Extinguishers can be recharged "on the spot" . . . providing continuing protection . . . and annual recharging of Ansul extinguishers is *NOT* necessary.

Safe to use . . . non-toxic, non-corrosive, non-abrasive.

Ask for your copy of file No. 222. You will receive factual data on how Ansul Dry Chemical Fire Extinguishers will cut your fire protection costs.

Listed and approved by Underwriters' Laboratories and Factory Mutual Laboratories.

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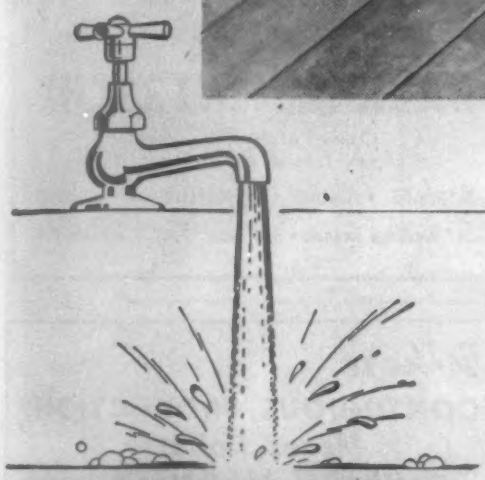
he was made supervisor of the production control department. In 1948 Riter was given the responsibility for all materials handling problems for all factories and warehouses of The Glidden Company.

P. R. Enzler (page 108) has been with Micro Switch since 1937 when it was a laboratory project. He spent the early days in the machine shop, later transferring to supervisory work in production and carrying on personnel work at the same time. After the total employment reached about 350, he gave up personnel work and concentrated on the manufacturing end of the business as general foreman. Enzler was appointed plant superintendent in 1941.

Edgar A. Harty, co-author (page 113—Part I appeared in the July issue), joined General Electric Company in 1923. His first assignment was as a test engineer and he then spent six years as a member of the Thomson Research Laboratory assigned to general research on metallic rectifiers. In 1930 he joined the rectifier division as engineer on metallic rectifiers for assignments on design, manufacture, application, and research on all products of the division. Harty is author of numerous articles on rectifiers in the technical press. He holds fourteen patents on rectifiers. He is a member of the AIEE, ESNE, Massachusetts Society of Professional Engineers, National Society of Professional Engineers, past chairman of the North Shore Chapter MSPE, national director of MSPE, and secretary of sub-committee on metallic rectifiers of the AIEE.

E. W. Hutton, co-author (page 113—Part I appeared in the July issue), joined General Electric on test assignment immediately after graduation from West Virginia University in



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That is one of the main reasons why PC Foamglas is the permanent insulation.

Water cannot get into or through PC Foamglas. Exhaustive immersion tests in the laboratory and long practical use in marine floats, rafts and buoys, have proved that.

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Please send me without obligation, your FREE booklets on the use of PC Foamglas Insulation for:

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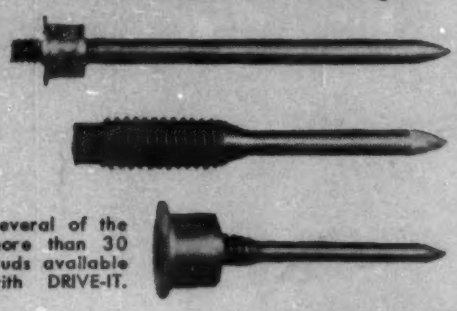
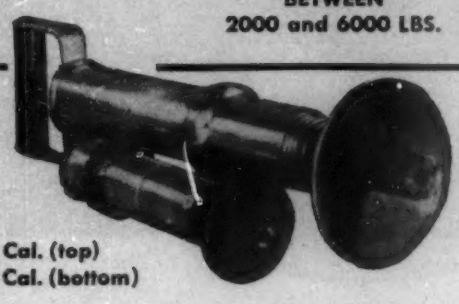
POWER OPERATED CONSTRUCTION TOOL

Drives Threaded Studs 3 Inches Into Concrete *Instantly!*



Several of the more than 30 studs available with DRIVE-IT.

STUD HOLDING POWER BETWEEN 2000 and 6000 LBS.



.38 Cal. (top)
.22 Cal. (bottom)

Thousands of DRIVE-IT Powder Power Tools are now in constant use from coast to coast.

3000 PERCENT FASTER

DRIVE-IT does in seconds what used to require hours. Eliminates drilling, hammering, compressors, electricity, cords, expansion bolts. Anchors anything to concrete, masonry or steel in a split second.

HOW IT WORKS

DRIVE-IT derives its power up to 25 tons from a small powder charge encased in a standard .38 or .22 cal. cartridge. The desired anchor stud and cartridge are placed in the tool. The DRIVE-IT muzzle is forced vigorously against the work and at the same time the safety catch is released. This detonates the charge, and drives the stud with pile-driver force into steel or concrete. DRIVE-IT studs in ordinary concrete will hold the weight of the heaviest automobile.

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Thousands of contractors, sub-contractors, and maintenance departments use DRIVE-IT tools to anchor wood sleepers to concrete; to "bolt" machinery; to hang metal lath, pipe, switch boxes, etc. See DRIVE-IT for yourself. Write for name and address of your nearest distributor, and full information.

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BEHIND THE BYLINE *(continued)*

1940. He entered the control engineering division in 1941 to work on Merchant Marine control equipment. In 1942 he was transferred to supercharger development at Lynn, Mass. He emerged from the service as a captain in the Army Air Forces in November, 1945. Upon returning to General Electric he joined the electronic section of the control engineering division and was assigned to rectifier design. In 1947 he was made line engineer for rectifiers. At present he holds the position of section engineer for a.c. power control in electronic and regulator control engineering division. Hutton is a member of the AIEE and is a member of its subcommittee on hot cathode converters. He is also a member of the subcommittee on electronic control of the Industrial Control Committee. In addition, he is a professional engineer in New York State.

Wilfred A. Okenfuss (page 118) assistant general superintendent of Wagner Electric Corporation, has been with the company about 28 years. He started working in the factory as a floor inspector in the ignition department. He later went to the generator and motor machining department. In June, 1922, he was transferred to the time study department. Five years later, he became head of that department. He has held his present assignment since February, 1946.

H. B. Jones (page 124) joined Lion Manufacturing Corporation in 1932, eight years after his graduation from Harvard University. Beginning as advertising manager, he soon was singled out by management to supervise many other activities. Coming under his hand were such responsibilities as approving new items for manufacture, and establishing new systems and procedures in close cooperation with the engineering department. With the beginning of World War II, Jones was elevated to vice-president in charge of operations, the position he holds today.

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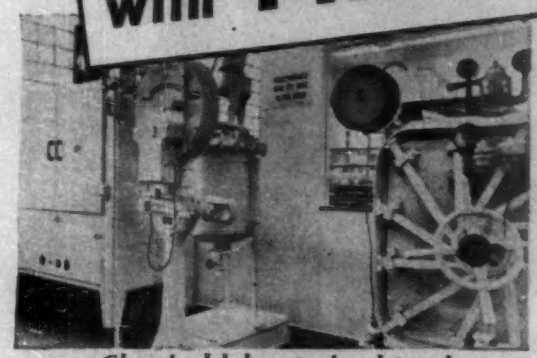

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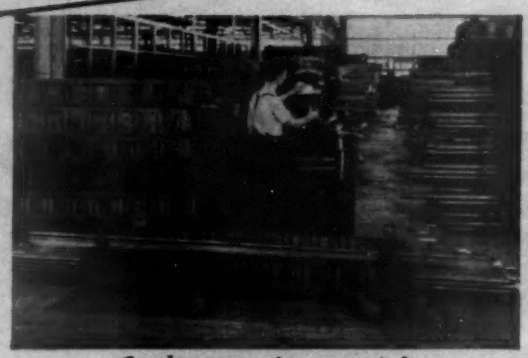

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BOOKS

QUALITY CONTROL

NORMAN L. ENRICH. The Industrial Press, 148 Lafayette St., New York 13. 122 pages. Diagrams, tables, formulas, graphs, index. $3.

Subtitled: A Manual of Quality Control Procedure Based Upon Scientific Principles and Simplified for Practical Application in Various Types of Manufacturing Plants. A review of recent developments, with emphasis on statistical methods. The material is presented in practical, down-to-earth terminology for average plant managers to help understand the problems involved well enough to apply them without the assistance of a specialist in the field.

BATTLEFRONTS OF INDUSTRY

DAVID O. WOODBURY. John Wiley & Sons, Inc., 440 4th Ave., New York 16. 342 pages. Photographs, index. $3.50.

The account of Westinghouse Electric Corporation in World War II, how this company designed and produced electric torpedos, optical instruments, insecticide containers, bomb fuses, mobile power houses, uranium by the ton, machinery for producing the atomic bomb, and many other items. Two chapters discuss fissionable material.

PRINCIPLES OF COST ACCOUNTING

DR. ERIK BOSSHARDT, Member, Institut d'Organisation Industrielle de Zurich, Switzerland. R. Winter-Verlagsbuchhandlung, Zurich 8, Switzerland.

"Leistungsmassige Kostenrechnumg," written in German, has been translated as "Price-costing according to product performance-value for the consumer." The subject matter is based on results of an extended inquiry by the Institut into price-costing principles applied in a number of important Swiss industries. The author has designed a price-costing system predicated on the present market value of all cost elements from the point of view of the consumer. Such elements as depreciation, working capital, interest, risk bearing, and ownership compensation are considered. This is followed by an analysis of the major problems of valuation and of the influence of the utilization of plant capacity on costs.

HISTORY OF FACTORY AND MINE HYGIENE

LUDWIG TELEKY, M.D. Columbia University Press, Morningside Heights, New York 27. 342 pages. Tables, bibliography, index. $4.50.

A discussion of the development of industrial hygiene from antiquity to the present day. Poisons, dusts, skin

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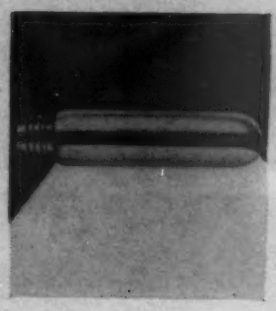

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Humorous consideration of the fundamentals of our social, political, and economic life, presented so that the different subjects can be used effectively in discussion with those of other than "conservative" beliefs.

BOOKLETS

MATERIALS HANDLING MANUAL. General Electric Co., Schenectady 5. 96 pages. Photographs, sketches, diagrams, tables, charts; formulas for materials handling calculations; engineering data; analysis of handling methods; cost analysis; bibliography. $1.

THREE JOINT LABOR-MANAGEMENT SAFETY CONFERENCES. Pulp and Paper Industry. Bureau of Labor Standards, U. S. Dept. of Labor, Washington 25, D. C. 22 pages. Facsimile letters, chart. No charge.

POWER, MACHINES, AND PLENTY. Gloria Waldron and J. Frederic Dewhurst. Public Affairs Pamphlet No. 142. Twentieth Century Fund, 22 East 38th St., New York 16. 22 pages. Tables, sketches, charts, bibliography. 20¢.

SURVEY OF PERSONNEL PRACTICES IN UNIONIZED OFFICES. Research Report No. 13. American Management Association, 330 West 42nd St., New York 18. 38 pages. Tables. $1.50 to members; $3 to nonmembers.

EXPERIENCE OF 117 COMPANIES WITH WAGE INCENTIVE PLANS. Report 561, Parts I and II. 89 pages. Tables, graphs, photographs, charts, bibliography. $7.50.

INDEX TO ASTM STANDARDS. Including list of titles in numeric sequence of ASTM serial designations. American Society for Testing Materials, 1916 Race St., Philadelphia 3. 248 pages. No charge.

THE IMPLICATIONS FOR EXECUTIVES IN THE 1947 LABOR-MANAGEMENT RELATIONS ACT. An address by John R. Bangs and James W. Townsend. The Budd Co., Philadelphia 32. 20 pages. No charge.

WHO, ME? Pointers in Job Management—A Guide for Improving Human Relations. Arthur O. England.

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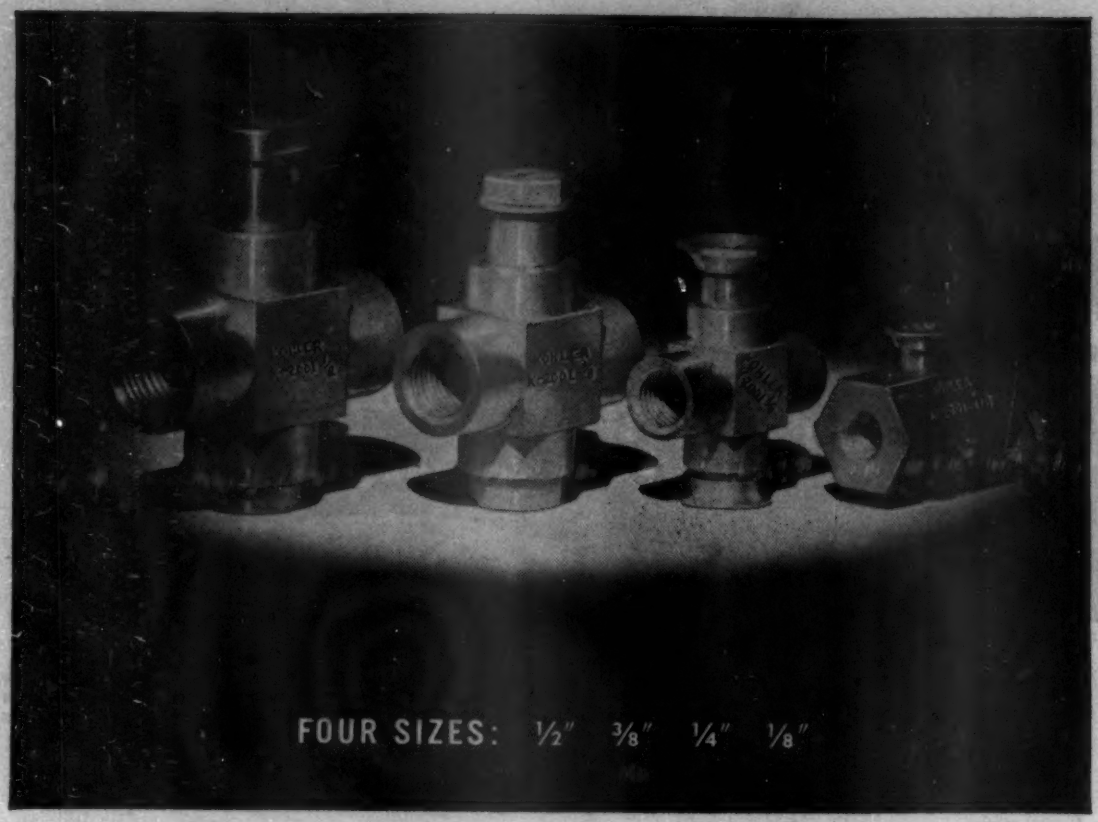

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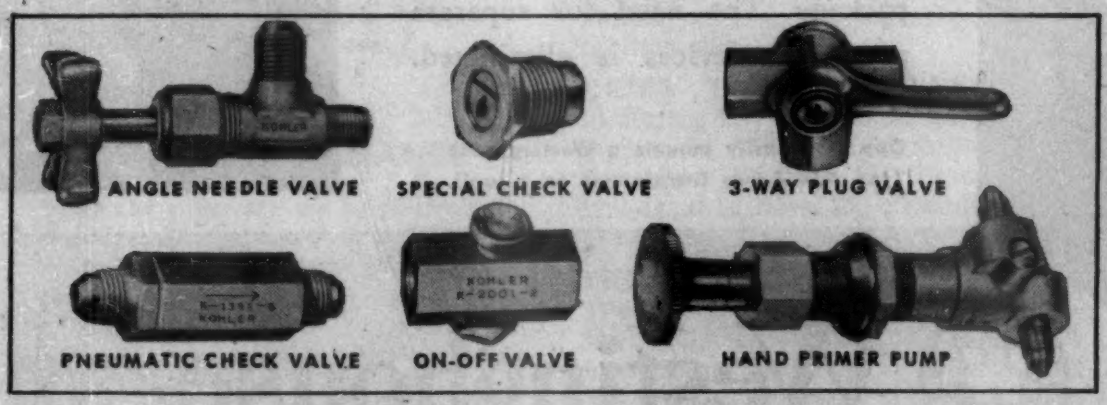

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National Foremen's Institute, Deep River, Conn. 24 pages. Two-color sketches. Single copies, 25¢; lower prices for quantity orders.

ON THE CALENDAR

AUGUST

22-26, National Association of Power Engineers, Inc., National Power Show and Convention, St. Paul Auditorium, St. Paul, Minn. A. F. Thompson, Director of Exhibits, 176 West Adams St., Chicago.

24-27, American Institute of Electrical Engineers, Pacific Coast General Meeting, Hotel Davenport, Spokane, Wash. H. H. Henline, Secretary, 27 West 39th St., New York 18.

30-Sept. 3, American Chemical Society, National Meeting, Washington, D. C. Alden H. Emery, Executive Secretary, 1155 Sixteenth St., N.W., Washington 6, D. C.

SEPTEMBER

6-10, American Chemical Society, National Meeting, St. Louis, Mo. Alden H. Emery, Executive Secretary, 1155 Sixteenth St., N.W., Washington 6, D.C.

7-9, American Society of Mechanical Engineers, Fall Meeting, Reed College, Portland, Ore. Ernest Hartford, Executive Assistant Secretary 29 West 39th St., New York.

9-17, Course in Quality Control by Statistical Methods, Purdue University. Prof. Irving W. Burr, Department of Mathematics, Lafayette, Ind.

13-17, American Chemical Society, National Meeting, Portland, Ore. Alden H. Emery, Exec. Secretary, 1155 Sixteenth St., N. W., Washington 6, D. C.

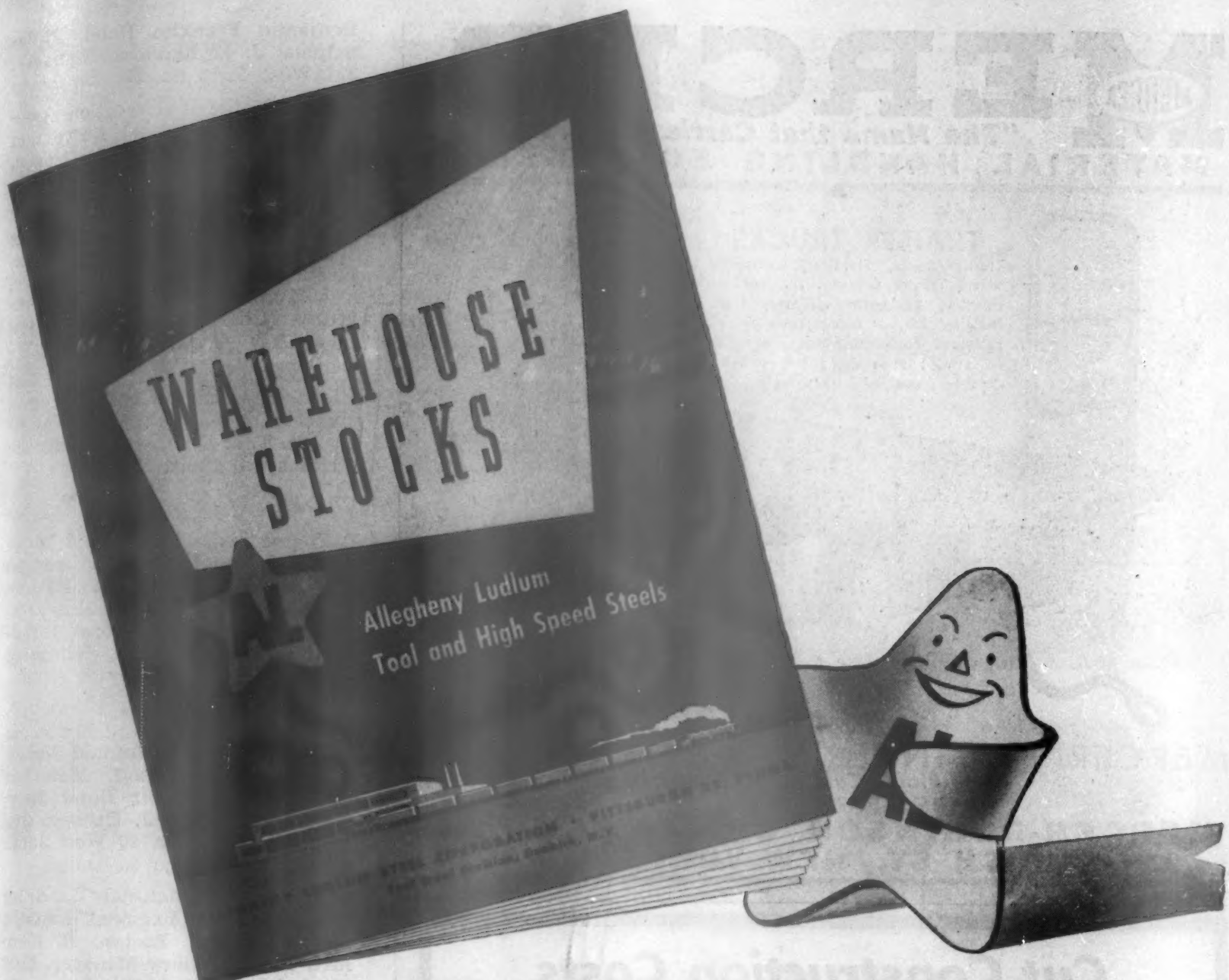
13-17, The Instrument Society of America, Third Annual Conference and Exhibit, Convention Hall, Philadelphia. Richard Rimbach, Exec. Secretary, 1117 Wolfendale St., Pittsburgh 12.

20-23, American Institute of Accountants, Annual Meeting, Palmer House, Chicago. John L. Carey, Secretary, 13 East 41st St., New York 17.

20-24, Illuminating Engineering Society, Annual Meeting, Hotel Statler, Boston. G. K. Hardacre, General Secretary, 51 Madison Ave., New York.

23-24, American Management Association, Conference on Industrial Relations, Hotel Pennsylvania, New York. Henry J. Howlett, Secretary, 330 West 42nd St., New York 18.

23-25, The National Association of Foremen, 25th Annual Convention,



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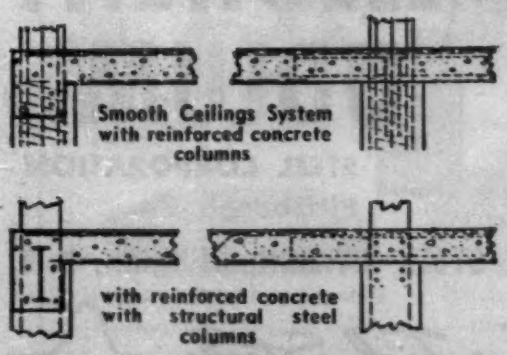

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26-Oct. 1, National Recreation Association, 30th National Recreation Congress, Hotel Fontenelle, Omaha, Neb. Thomas E. Rivers, Secretary, 315 Fourth Ave., New York 10.

27-Oct. 1, Society of the Plastics Industry, National Plastics Exposition, Grand Central Palace, New York. Ronald Kinnear, Committee Chairman, 295 Madison Ave., New York.

28-Oct. 1, Association of Iron & Steel Engineers, Annual Convention and Exposition, Cleveland Public Auditorium. T. J. Ess, Managing Director, Empire Bldg., Pittsburgh.

OCTOBER

4-7, Course in Packaging and Materials Handling, held in conjunction with 3rd Annual Industrial Packaging & Materials Handling Exposition. Dr. Lisle A. Rose, Director of Public Relations, College of Engineering, University of Illinois, Urbana, Ill.

4-7, Industrial Packaging Engineers Association, Third Annual Industrial Packaging and Materials Handling Exposition, Hotel Sherman, Chicago. C. J. Carney, Jr., Managing Director, 20 West Jackson Blvd., Chicago 4.

5-7, New England Materials Handling Exposition, 1st Regional Exhibit, Mechanics Hall, Boston. R. Kennedy Hanson, Show Manager, 1108 Clark Bldg., Pittsburgh 22.

5-15, Course in Quality Control by Statistical Methods, State University of Iowa. Lloyd A. Knowler, Chairman, College of Engineering, State University of Iowa, Iowa City.

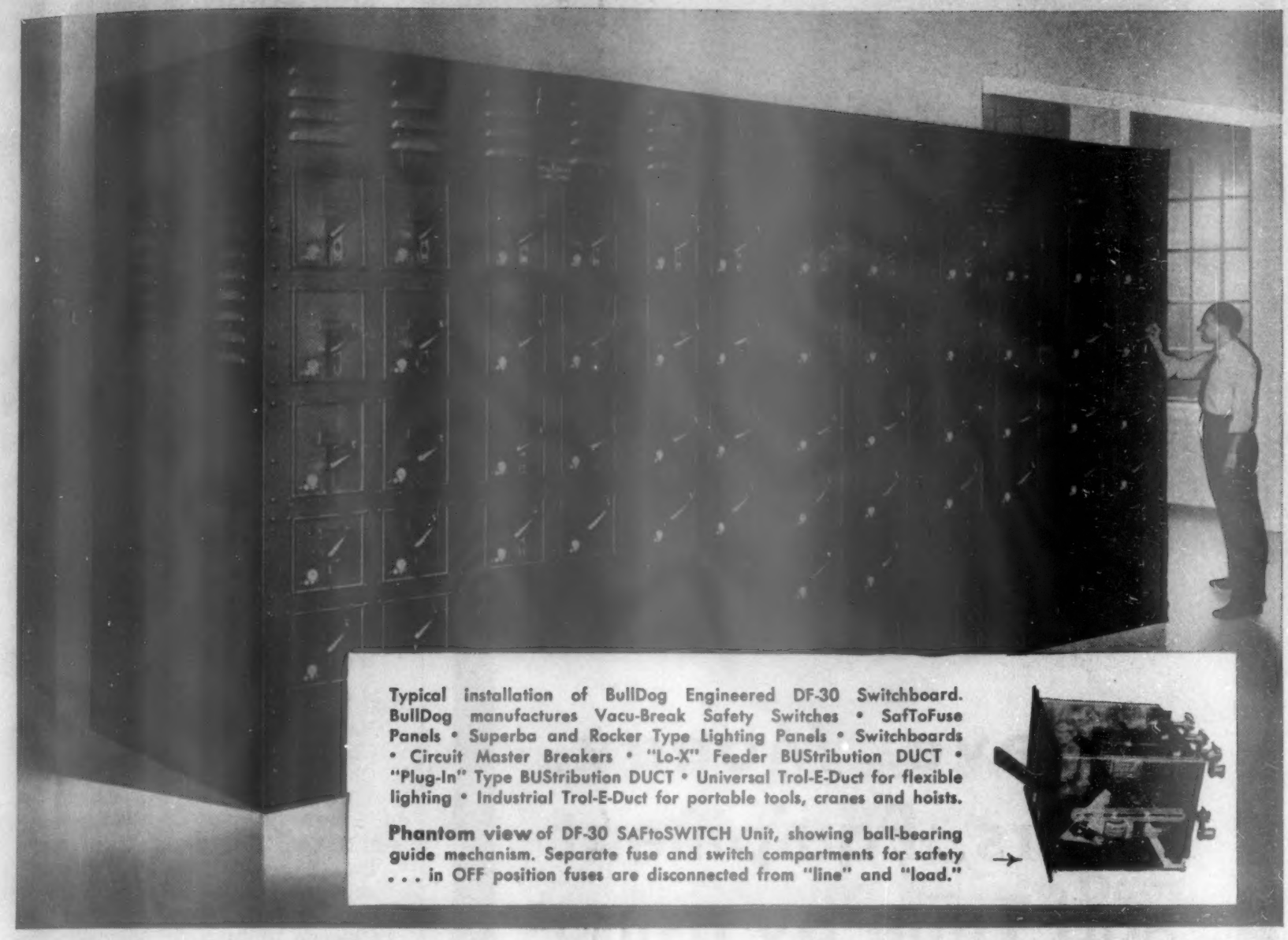
12-13, American Society of Tool Engineers, Semi-Annual Convention, Biltmore Hotel, Los Angeles. Harry E. Conrad, Exec. Secretary, 1666 Penobscot Bldg., Detroit 26.

18-22, National Safety Council, Inc., 36th National Safety Congress and Exposition, Stevens Hotel, Chicago. Ned H. Dearborn, Exec. Vice-President, 20 North Wacker Drive, Chicago.

20-21, National Conference on Industrial Hydraulics, Hotel Sheraton, Chicago. V. L. Streeter, Conference Director, Armour Research Foundation, Technology Center, Chicago 16.

20-22, American Standards Association, Annual Meeting, Waldorf-Astoria, New York. Vice-Admiral George F. Hussey, Secretary, 70 East 45th St., New York.

24-29, American Welding Society, Annual Meeting, Bellevue-Stratford Hotel, Philadelphia. M. M.



Typical installation of BullDog Engineered DF-30 Switchboard. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panels • Superba and Rocker Type Lighting Panels • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution DUCT • "Plug-In" Type BUStribution DUCT • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes and hoists.

Phantom view of DF-30 SAFtoSWITCH Unit, showing ball-bearing guide mechanism. Separate fuse and switch compartments for safety . . . in OFF position fuses are disconnected from "line" and "load."

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WHEN your Main Switchboard is the BullDog DF-30 type, your power system headaches end.

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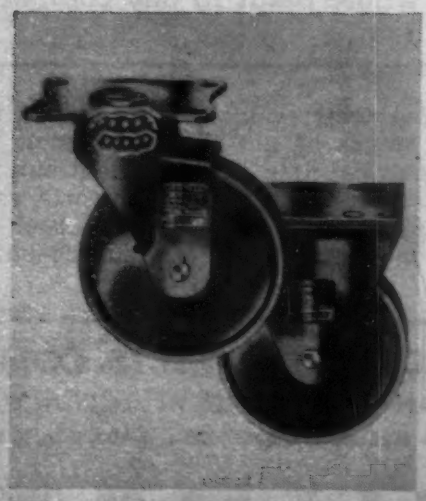

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Kelly, Secretary, 29 West 39th St., New York 18.

25-29, American Society for Metals, 30th Annual National Metal Congress and Exposition, Benjamin Franklin Hotel, Philadelphia; in conjunction with American Welding Society; Institute of Metals, Div. of American Institute of Mining & Metallurgical Engineers; and The Society for Non-Destructive Testing. W. H. Eisenman, Secretary, 7301 Euclid Ave., Cleveland.

28-29, The Society for the Advancement of Management, Annual Conference, Pennsylvania Hotel, New York. Carl S. Coler, Exec. Director, 84 William St., New York.

NOVEMBER

3-4, American Institute of Mining Engineers & American Society of Mechanical Engineers, Joint Fuels Conference, Greenbrier Hotel, White Sulphur Springs, Md. Harry Maloney, Assistant Treasurer, 29 West 39th St., New York.

3-5, Industrial Management Society, National Time and Motion Study Clinic, Hotel Sheraton, Chicago. Charles S. Becker, Vice-President, 176 West Adams St., Chicago 3.

4-6, National Electronics Conference, Inc., Edgewater Beach Hotel, Chicago. Leo Killian, Publicity Chairman, 1457 Diversey Parkway, Chicago 14.

7-12, National Electrical Manufacturers Association, Annual Meeting, Hotel Traymore, Atlantic City. R. J. Blais, Convention Manager, 155 East 44th St., New York.

8-9, National Association of Suggestion Systems, Annual Fall Conference, Hotel Drake, Chicago. F. A. Denz, President, 112 South Michigan Ave., Chicago 3.

17-19, Industrial Hygiene Foundation of America, Inc., Annual Meeting, Mellon Institute, Pittsburgh. John F. McMahon, Managing Director, 4400 5th Ave., Pittsburgh 13.

17-19, National Metal Trades Association, 49th Annual Convention, Waldorf Astoria, New York. Homer D. Sayre, Commissioner, 122 South Michigan Ave., Chicago.

28-Dec. 3, American Society of Mechanical Engineers, 69th Annual Meeting, Hotel Pennsylvania, New York. Ernest Hartford, Executive Secretary, 29 West 39th St., New York 18.

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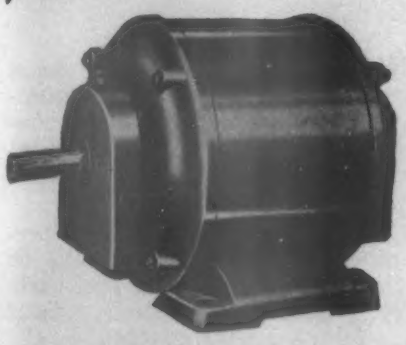

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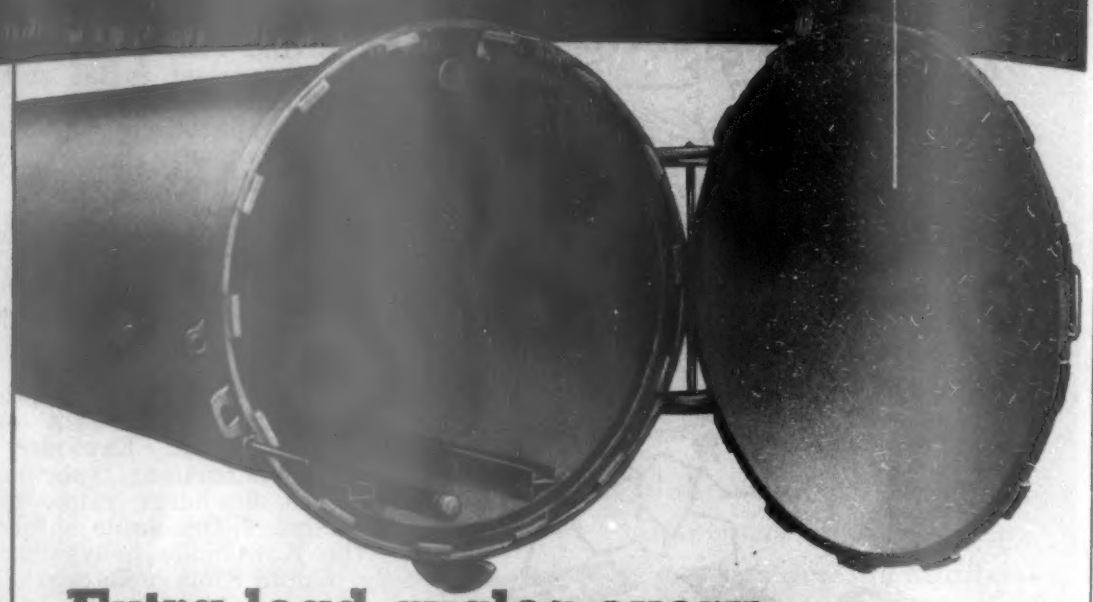

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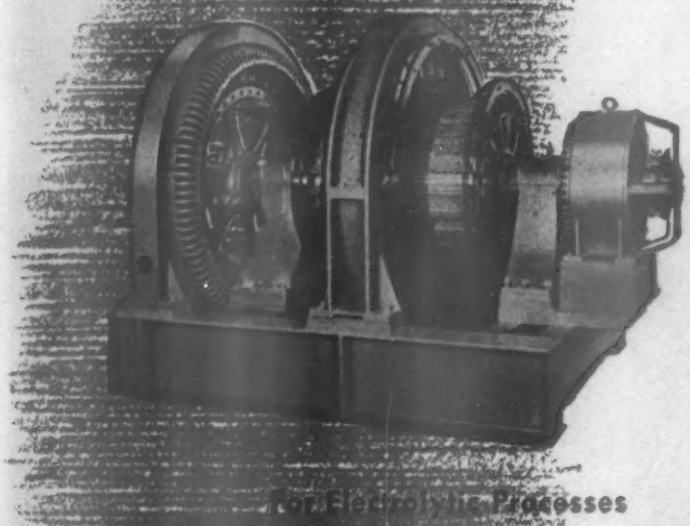

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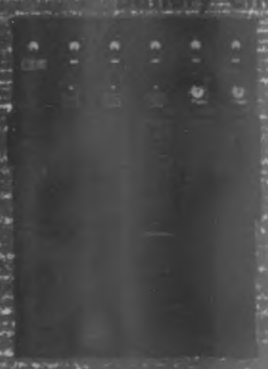

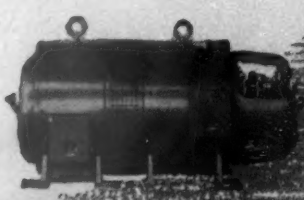

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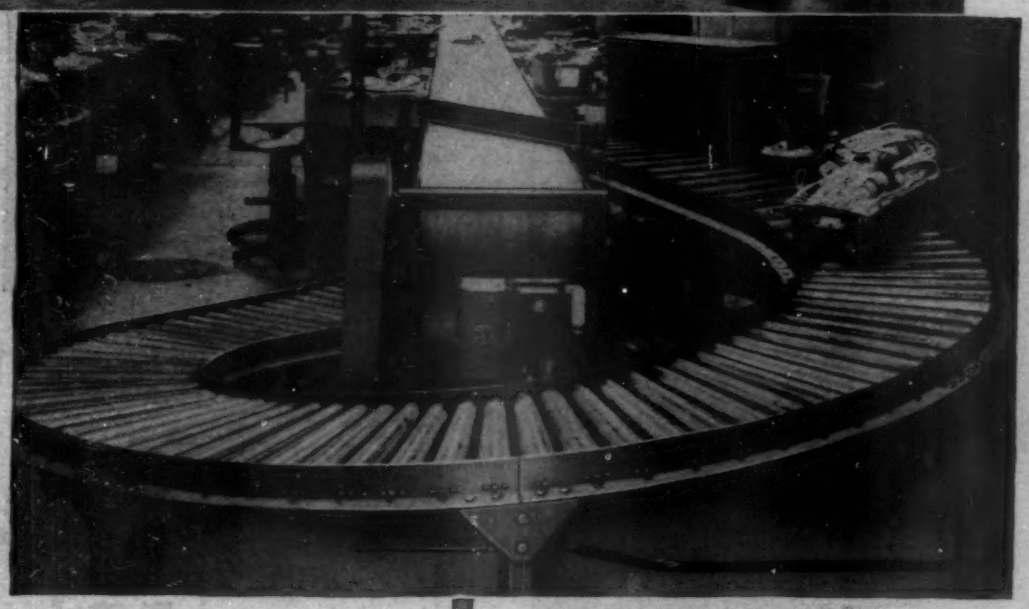

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water types; 48-page Catalog 348. 4 types; design, construction, dimensions, performance data. **13 (b)** Catalog 448 gives same information on cooling coils; divided into Section I, a descriptive bulletin; Section II, technical data on water coils; Section III, technical data on direct expansion coils. Moline Mfg. Co.

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COUPLINGS—flexible, for direct-connected drives; 4-page Index 2197. Chart on "How to Select Right Size Couplings." The B. F. Goodrich Co.

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CRANE—Model EC-15 Tournacrane with Model C-10 Tournapull. Specifications, capacities, maneuverability. R. G. LeTourneau, Tournalayer Div.

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DRIVE, VARIABLE-SPEED — Adjustable-diameter wedgebelt type. Four-page Bulletin WRB-48. Tables show how to select correct drive. The American Pulley Co.

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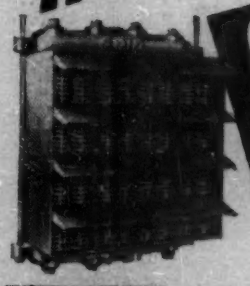

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LIFT TRUCK — battery-operated, called Load-Mobile. Bulletin 1101 shows construction, capacities, dimensions, uses. Market Forge Co.

38

LIGHTING EQUIPMENT — cold cathode fluorescent lamps, luminaires, accessories. Catho-Lite Co.

39

LIGHTING EQUIPMENT — 39 (a) Advance Data Sheet 555, on single-row continuous light strip for 40-watt fluorescent lamps using large cross-section channel. **39 (b)** Bulletin 50-E covers pit, step, tunnel, aisle, and signal lights. Supersede Nos. 10 and 12 Incandescent Catalogs. Day-Brite Lighting, Inc.

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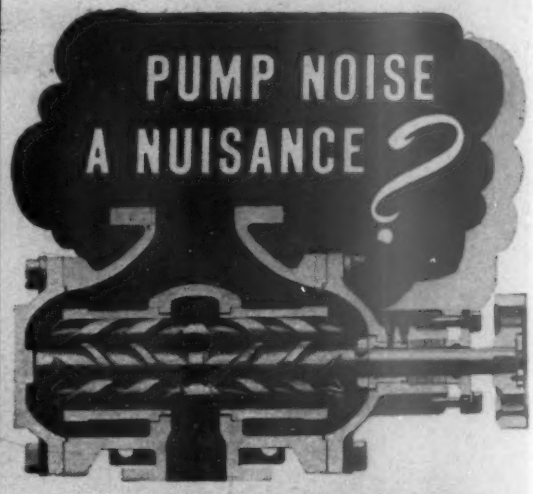

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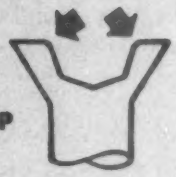

Prevents pushing up burrs because contact with driver begins just below top surface of screw head. Easy for driver to "ride in" to a firm seat, without excess strain on driver.

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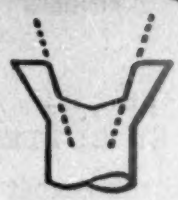
Absence of sharp corners provides wider center opening. This recess shape aids self-centering of driver. It also permits driving tool contour that insures maximum strength.

RECESS WALLS HAVE MINIMUM TAPER



Steep walls resist tendency of driver to ride or "cam" out of recess. Consequently, less end thrust is needed at any torque. Driver seats fast—stays seated.

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A little "heavy-handed". Hates driver "skids" because he knows their cost in delays and damage. Wants Phillips' automatic self-centering—knows it prevents "skids". Likes rugged Phillips' driver tips.

Wants to learn fast to work fast. Needs assurance of easier fit of driver in Phillips Recess. Can expend effort in *turning* screw, not in holding driver in recess. Avoids "skids" that gouge work or hands.

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Top skilled workers might gain some advantage with any type of cross recess. But many are not top skilled.

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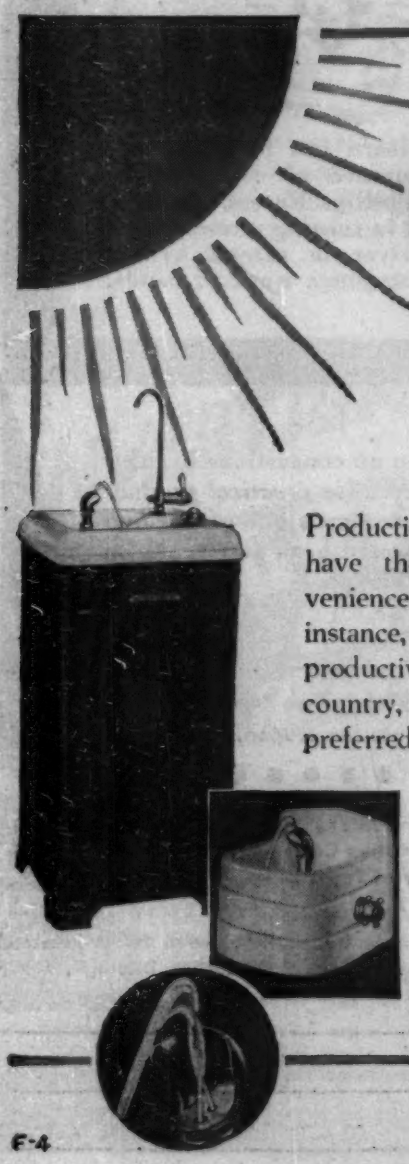

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ing, dimensions of different models. Bulletin EM-47, 12 pages. Electrical Mfg. Div., The National Acme Co.

41

MARKING MACHINES — various models for use on bags, bottles, bales, boxes, canisters, cards, cartons, cases, crates, cups, cylinders, envelopes, jars, labels in bulk, metal parts, plastic products, rolls. Eight-page Catalog 030. Adolph Gottscho, Inc.

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MATERIALS HANDLING—House organ, Vol. 1, No. 1, called The News-veyor, reports developments in materials handling. Mechanical Handling Systems, Inc.

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MATERIALS HANDLING — Job study No. 74, report of system set up at Campbell Works of The Youngstown Sheet & Tube Company to handle mass production of bulky, heavy products. Towmotor Corp.

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MECHANICAL SEAL—called Dura Seal Type PS, a high-pressure, non-lubricated sealing for light hydrocarbons. Features, characteristics. Durametallic Corp.

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METAL AND BRONZE PRODUCTS—Bulletin 95, 16 pages. Information on wide range of bronze products and alloys. Ampco Metal, Inc.

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MILLS — Bulletin 16-W; cutting speeds, uses, materials, regrinding possibilities, specifications, prices of different models, accessories. Severance Tool Industries, Inc.

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MOTORS—non-rotating, double-acting, reciprocating power units with built-in valve, valve operating controls, independent piston stroke speed controls. The Bellows Co.

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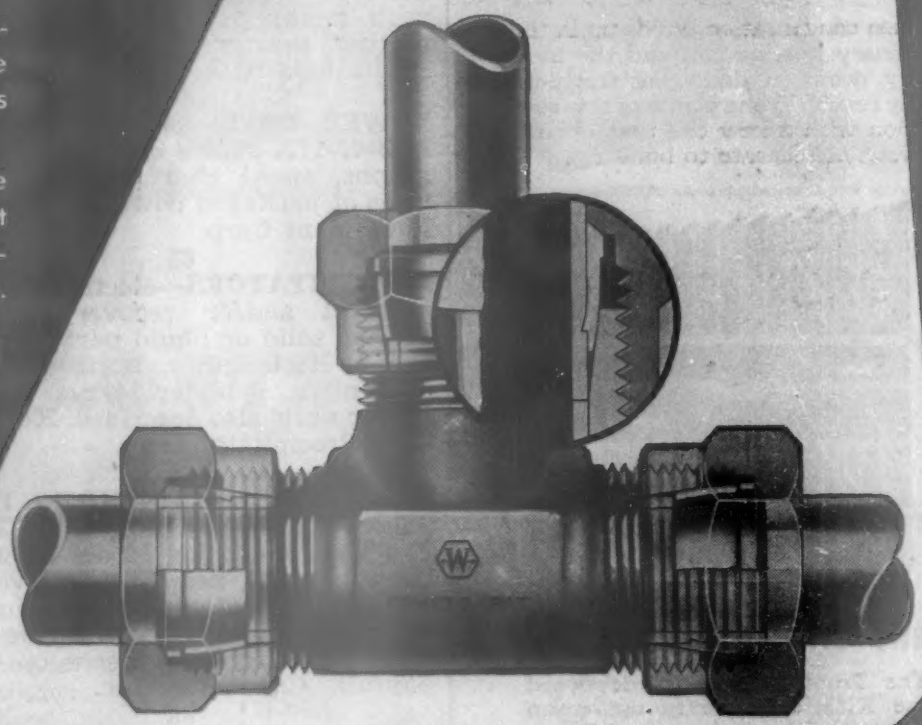

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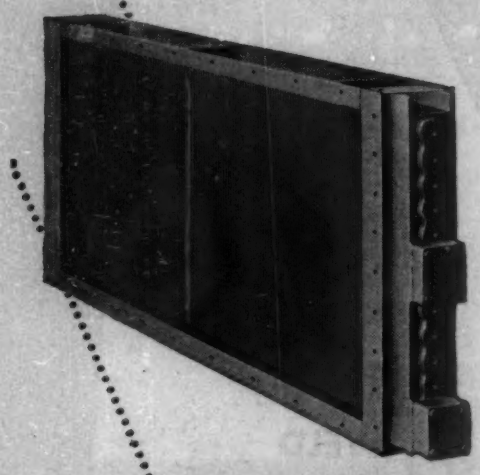

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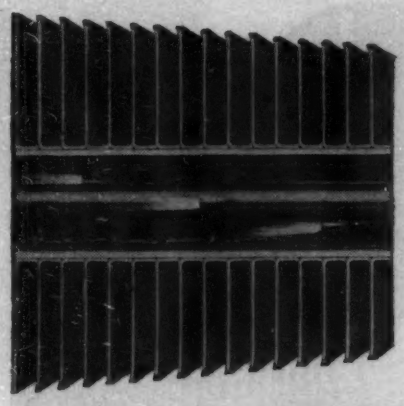

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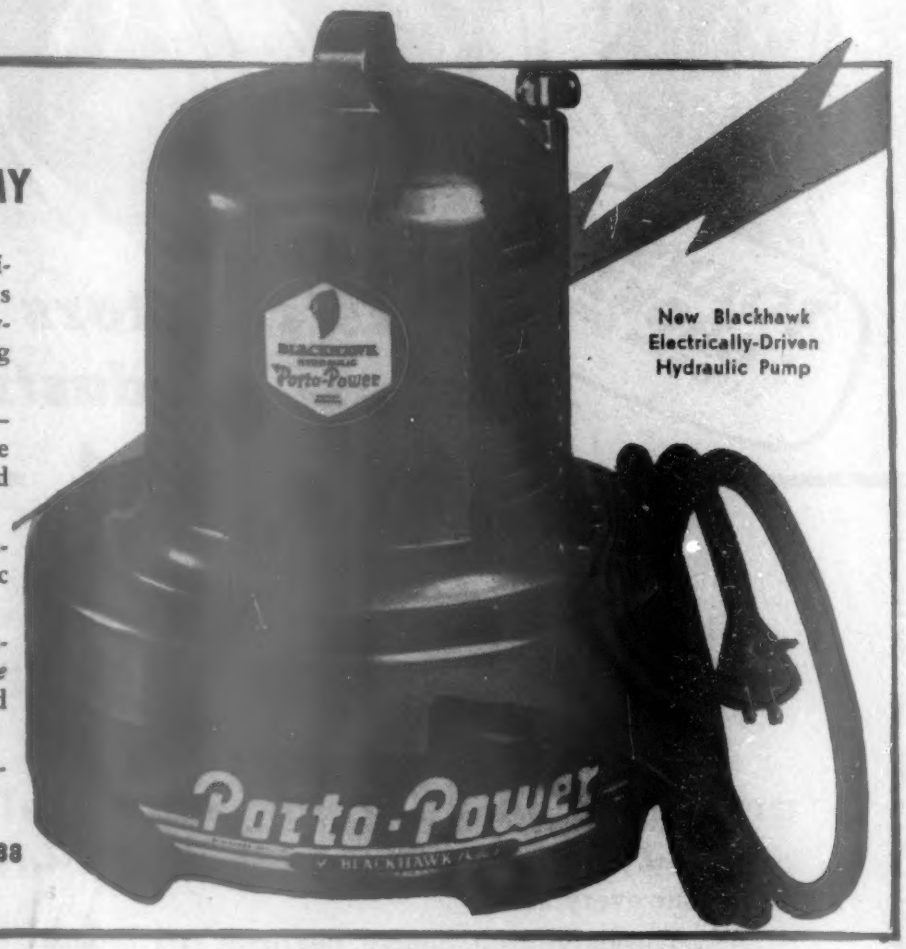

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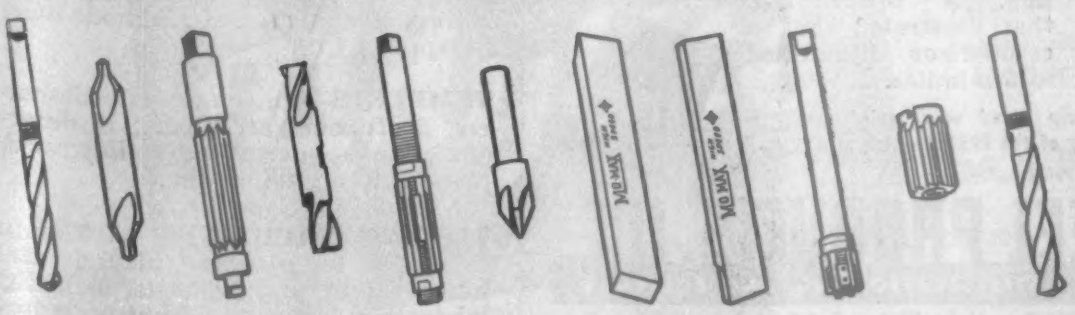

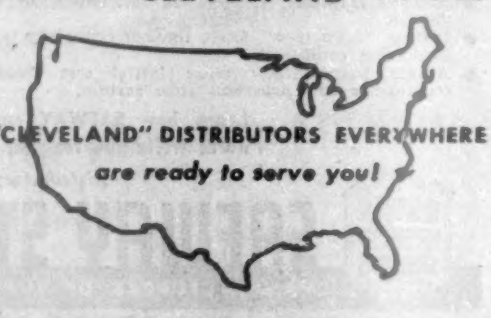

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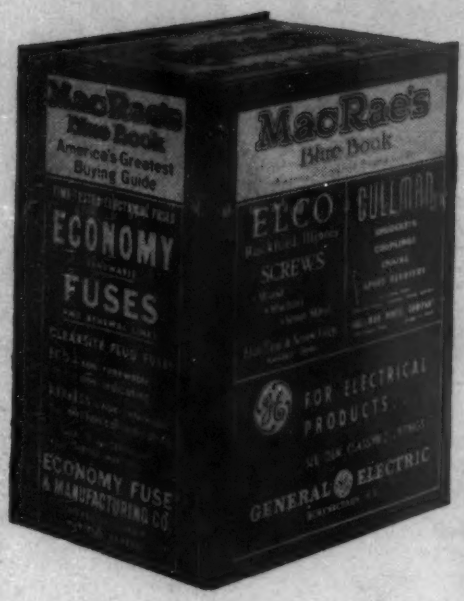

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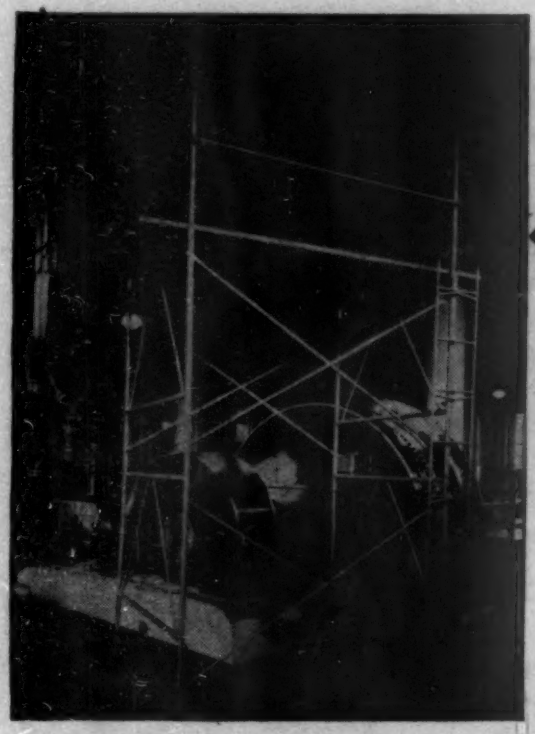

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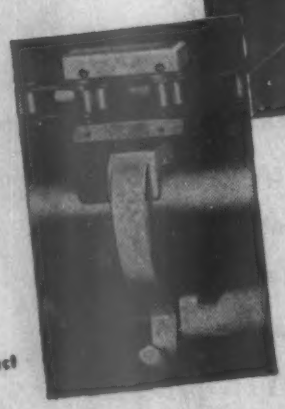

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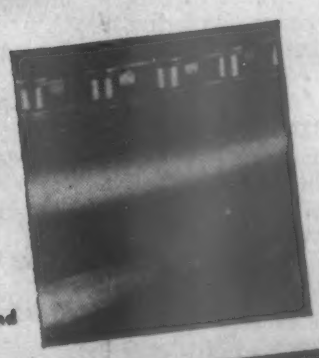

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